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AMERICAN AND OTHER PATENTED INVENTIONS.

OCTOBER, 1829.

On the Atmospheric Influence of Woods.

The effects produced on climate, by the preservation or destruction of forests, is an interesting subject of inquiry, which has sometimes engaged the attention not only of philosophers, but of legislators. In France, about forty years ago, some alarm was created, on account of the rapid cutting down of woods, which had then changed owners, or were less carefully protected than they had formerly been. Where wood forms a great part of the fuel of a country, a strong motive will always exist for the planting of trees, and for guarding against their wasteful removal. But another evil than the deficiency of firewood, was then apprehended. It was contended by Cadet de Vaux, and other writers, that the great droughts experienced in some districts, were caused by the absence of the trees, which used to attract the clouds, and thus conduct to the earth those fertilizing showers, which reward the labours of the husbandman with an abundant harvest. Amidst the agitations of the revolution, the complaints of these writers were listened to, and their representations were more than once brought under the consideration of the Convention, and the Council of Five Hundred. We do not precisely recollect what legislative measures were adopted; but we believe, among other things, the sale of the National Forests was stopped. However, it does not appear that what was then done, though it may have saved some of the property in the possession of the state, had any important effect on the whole. Indeed, it will be seen from what follows, that since that period, the woods of France have sus-

tained a considerable diminution, equal in extent to the difference between $\frac{1}{7}$ and $\frac{1}{13}$ of the territory.

In the mean time, the investigation of this interesting subject has not been neglected. The attention of naturalists and men of science in the Netherlands, was, in the course of last year, called to the alterations produced in the physical state of countries, by the destruction of forests, in consequence of a prize for the investigation of this important question, being offered by the Royal Philosophical Society of Brussels. The essay which obtained the prize, was written in French by M. A. Moreau de Jonnes, a staff-officer in the army. It appears that the author does not altogether concur with M. Cadet de Vaux; but we have not seen the original, and the following account has reference to a German translation, by M. Widenmann, Professor of Natural History, at Tubingen. In Germany, where great importance is attached to the subject, the work of M. Moreau de Jonnes has been, upon the whole, very favourably noticed by the reviewers of that country, and we have taken the liberty to make use of some of their observations.

The author begins with a statistical account of certain woods and forests, from which, though he complains of the insufficiency of the documents available for his calculation, at least one conclusion, which appears pretty well founded, may be drawn. According to the data here made use of, the woods in France amounted, in 1750, to more than a fourth of the surface of the whole country; in 1788, to a seventh; and in 1814, to not quite a twelfth of that surface. Thus, within sixty-four years, 5000 square miles of the woods of France must have disappeared. In England, according to the author's estimate, the woods amount to only one twenty-third of the surface.

Chap. I.—*Influence of Woods on the Temperature of Countries.*

Woods lower the temperature. In the author's opinion, they have this effect, because, on account of their dark colour, they reflect back few rays of light and heat to the atmosphere, and because they keep the soil damp, and, therefore, render more heat necessary to promote evaporation. But whether the difference of the mean temperature between Rome and Massachusetts, which, in the same geographical latitude, amounts to $6\frac{1}{2}$ cents of a degree, is to be attributed almost entirely to the woods, does not appear so easily demonstrable. That woods on mountains have a great influence in intercepting and beating down vapours is very probable; but the author's assertion, that the increased condensation of vapours has for its consequence a greater absorption of heat, is unsupported by proof. It must also be observed, that though woods diminish temperature, and though the author proves this fact by practical observations, yet the experiments as cited by him are so detached, as to leave room for considerable objection. Vienna and Troyes have not a difference of temperature, merely because eastern countries are generally more covered with wood, but also because the site of Vienna is 250 feet higher, and lies nearer high mountains than Troyes. Again, Berlin is colder than Leyden in Holland, not altogether in consequence of Branden-

burg being a woody country, but also because it is exposed to the cold east wind. The translator points out the difference of height, which in the original is unattended to.

The author shows from historical comparisons, that the clearing away of woods makes the temperature of countries warmer. Whether the proofs that he adduces for this purpose are all quite convincing, we cannot positively affirm, though the fact itself is true; for France is no more deprived of its woods than England. If, then, there be, at present, nearly the same degree of heat in London and Paris, while, in the time of Tacitus, Gaul must have been colder, it is not quite clear why this contrary influence should proceed from the same cause. But it is also doubtful whether Tacitus would not, even now, if he had no assistance from the thermometer, call London milder than Paris, because severe winters occur less often in the former than in the latter city. But though the details of these comparisons may occasionally be uncertain, and more particularly those which relate to the question, whether a difference of temperature in former times ought to be attributed solely to the great abundance of woods and forests, yet a collection of the accounts of a greater degree of cold having heretofore existed, is doubtless very important. There can be but few to whom it will not be interesting to learn how much the cold of winter, especially in the south of Europe, has diminished.

Chap. II.—*Influence on the quantity of Rain.*

The author here brings forward some observations to prove that more rain falls on the sea coast than in inland districts, and that, moreover, when chains of mountains run parallel to the sea-shore, the sides next the sea receive more rain than their opposite sides. In reference to woods, however, the author supposes that he may lay it down as a fact confirmed by observation, that woodlands in flat countries do not perceptibly increase the quantity of rain; but that woods on mountains have a perceptible influence in producing that effect. He thereupon founds the conclusion, that if mountains are planted with trees, the quantity of rain in their vicinity will be increased, and that the progressive diminution of rain in the south of Europe is to be ascribed to the destruction of the mountain woods. But the author does not appear to have been sufficiently careful in ascertaining what are the places in which the rain has diminished. It has not diminished in all parts of the south of Europe; for Flaugergues has found that the quantity of rain has considerably increased at Viviers, in the south of France, since 1778. The Milanese Ephemerides indicate the same thing for Milan, and all the assertions of this kind require further demonstration.

Chap. III.—*Of the Influence of Woods on the Humidity of the Atmosphere.*

Here the author describes, among other things, an interesting experiment with the hygrometer, according to which the humidity of the air in the West Indies is found to be expressed by the numbers

3, 4, and 15, according as the observations are made on the coast in the midst of cultivated plantations, on the borders of mountain woods, or in the midst of those woods. There seems, however, to be some obscurity in an observation which the author is induced to make, namely, that the humidity of woods in the torrid zone extends *far* above the extremity of the scale. Now, as the hygrometer is usually graduated up to the point of complete humidity of the atmosphere, it can only be said that the moisture is precipitated in greater abundance than is necessary to bring the hygrometer to the highest degree.

We cannot venture to quote any more of these observations, or to explain the grounds of the doubts to which the conclusions drawn by the author give rise. But notwithstanding these doubts, we confess with pleasure that much information is to be found in the work. At the same time, we must regret that the translator has not given to his version that great superiority over the original which it would have obtained had he subjected several of the author's statements, such as those relative to the comparative humidity of the Mark of Brandenburg and Holland, to critical investigation.

CHAP. IV.—*Influence of Woods on Springs and Running Water.*

That countries, especially mountainous countries, which are covered with woods, also abound more in waters than others, is a fact which may be asserted with little fear of contradiction.

CHAP. V.—*Of the Influence of Woods on the Wind and on the State of the Atmosphere with respect to Health.*

Though many remarks which occur in this chapter are just, we are much surprised at some of the assertions, and we think we do not err in considering them unfounded. Among these is the assertion, that the impetuosity of the winds, where there are no woods to mitigate its violence, has rendered a great part of Great Britain barren. If the author's estimate, that the waste lands amount to $\frac{2}{3}\frac{3}{3}$ of the whole surface of Great Britain be true, it does not follow that these lands are barren in consequence of a deficiency of trees. The heaths in the north of Germany, which are not all situated in places entirely destitute of woods, show clearly enough that circumstances, which accompany an effect, are not always those which produce it.

The comparison between that part of Tartary inhabited by the Calmucks and Lombardy, appears to be equally unfounded. Whoever, in this instance, though the geographical latitude should be the same, expects to find the climate in both regions alike, and ascribes the dissimilarity of the climate to the want of trees in Tartary, must certainly have allowed many circumstances, which ought to have been taken into account, to pass unnoticed.

CHAP. VI.—*Influence of Woods on the Fertility of the Soil.*

We also meet with many remarkable observations and important conclusions in this chapter. But upon the whole, we think that this

essay must be considered as a work which has not been reflected upon with sufficient deliberation. Nevertheless, it contains an abundant collection of curious facts; and though some of these facts are not well applied, and the accuracy of others remains to be proved, the book will, in the mean time, be found an excellent contribution towards the explanation of the subjects of which it treats.

There are, occasionally, some obscurities in the reasoning; but whether these ought to be attributed to the author or the translator, we have not at present the means of determining.

[*Quarterly Journal.*

Account of a new method of Filtering Water, invented by JAMES WHITE, ESQ. Engineer.

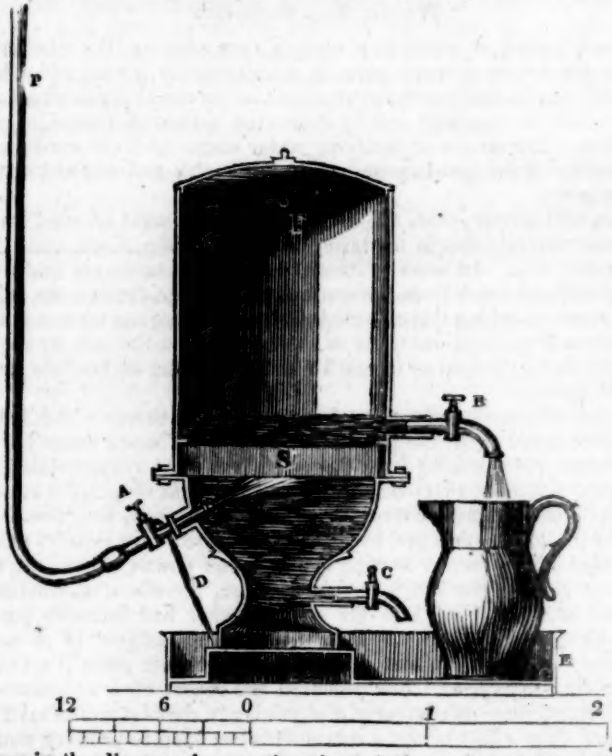
THE filtration of water in a mountainous country like Scotland, where water is in general pure, is comparatively a subject of less interest than in flat and fenny districts, or in great cities like London, which is supplied chiefly from the collected waters of the Thames. The means of purifying water under such circumstances, is a matter of the first importance to the health and comfort of the community.

It is well known, that, till of late years, the want of good water has been severely felt in the lower parts of Lincoln, Kent, and other fenny districts. In some of these, where the inhabitants and their cattle suffered much from the want of good water, the evil has lately been removed where this essential necessary of life has been supplied by means of perforations made to a great depth in the soil, by boring with an iron auger, so as to reach and bring to the surface the deep-seated springs.

In the metropolis, every one knows the great outcry which has of late been made about the polluted state of the Thames water for domestic purposes, arising from this river being the receptacle of the drainage waters of that overgrown city. In point of fact, (as noticed by our distinguished countryman, Mr. Stevenson, engineer,) the waters of the Thames are changed or renewed very slowly, nearly the same body of water moving upwards and downwards as the tide flows or ebbs. The inhabitants of London, therefore, may actually be said to be receiving into the stomach what had formerly passed through the public drains. This has become a subject of so much notoriety and interest, that government has of late made it a matter of public inquiry, and has procured the report of a committee of professional men, consisting of a physician, a chemist, and a civil engineer. The effect of these movements has been to produce numerous plans for supplying the city from a purer source, and also for filtering the water which it already possesses. Among these may be mentioned a plan by Mr. James White, engineer, of Oxford street, London, and another by Messrs. Stirling and Son, of Lambeth, who have invented a machine called the "Rapid Filter," and obtained a patent for it. Having no drawing of Messrs. Stirling's apparatus,

we shall at present confine ourselves to a notice of Mr. White's "Patent Artificial Spring," as given by himself.

"When new inventions, which promise to be of public utility, present themselves to our notice in a simple form, a degree of surprise is excited, that they should hitherto have eluded the research of ingenious men, whose lives have been devoted to mechanical pursuits. It is certain there are but few things of greater importance to the comfort of every family than water, which shall be good in quality, and provided in sufficient quantity for all the purposes of domestic use. That both these effects are produced by this invention, will be best shown by a description of the annexed diagram, and an account of the experiment, as tried at the house of the nobleman who was the first to patronize the design. The figure, as



shown in the diagram, is a section through the centre of the machine, which shows the whole of its interior construction. The cistern containing the water is not introduced, as its height would exceed the limits of the diagram; but let the small pipe, P, be supposed to communicate with it, and be of any length, from 10 to 100 feet: it is, however, necessary to bear in mind, that the quantity filtered will

always be proportioned to the area of the stone multiplied into the height of the column or pipe. The advantage, therefore, of employing a high cistern to supply the machine, requires no other recommendation.

"Three years ago, in the south of Russia, in the government of Poltava, when, on a mission appointed by the late emperor to examine the mechanical and agricultural state of that part of the Russian empire, it fell to my lot to give a design for filtration on a large scale. To effect that object, I introduced the water to be filtered below a bed of sand and gravel: it was intended for the purpose of washing wool, consequently did not require that purity produced by this invention. But at the house of the nobleman I have already alluded to, I attached a half inch leaden pipe to a cistern, which was already fixed thirty-five feet above the ground-floor, where I placed the machine. The other end of the pipe I made water-tight, by fixing it to a nozzle in the apparatus, below a proper filtering stone. Upon turning the cock, A, which shuts off the communication betwixt the machine and the cistern, the water rushed down from the cistern with great force, and very soon displaced all the air contained in the apparatus through the pores of the stone S; after which, the water began to ascend, and to flow in a filtered stream at the cock, B, so as to fill a gallon measure in about two minutes' time. Its appearance in small bubbles, rising through every pore in the stone, from the great pressure of the column of water contained in the small pipe, P, suggested to me the name which I have given it, of an artificial spring; and further experience has fully convinced me, that I have not applied to my invention an unmerited title. From the construction of the apparatus, the sediment and animalculæ will fall to the bottom, and be drawn off at the under cock, C, and run off by the waste pipe, E. In cases where several gallons are wanted at the same time, and it might be inconvenient to wait until it be filtered, shut the cock, B, leave A open, and in a few minutes, with a pressure from a cistern of thirty feet high, eight or ten gallons will be found filtered in the top part of the apparatus, which can be drawn off at B for immediate use, as required. Should it filter more than the top reservoir contains, while A remains open, it will run off waste at F; the cock, A, can be so constructed as to shut of its own accord, but in this case the machine would not be so simple. The cock, A, is of a peculiar construction, and well merits the attention of the reader: at the same time that it shuts off the communication betwixt the machine and the cistern, it opens, when turned one way, through the tube D, a small passage to the atmosphere. By this contrivance, the filtered water in the top part of the machine is allowed to subside the contrary way through the stone, a process which must naturally tend to wash its pores clean; and we know that all filtering substances are subject to get clogged up, from particles of fine sediment lodging in their pores. But what back filtration does not remove in my invention, another beautiful and simple phenomenon completely effects. Open the under cock, C, and then shut it again as fast as possible: this will produce an immense pressure on

the stone, and the water will be forced through with so much rapidity as to clean its pores completely. From what cause, I have not yet been able to ascertain, but it invariably happens, after the process of forcing the air through the stone, that the power of filtration is diminished considerably, and it is several hours before its power is restored. It may be presumed that the air lodges in the pores of the stone, and shows considerable obstinacy in being removed. When back filtration is not required, for it is only necessary for keeping the stone clean, the cock, A, must be shut off, with the notch in the top of it towards the machine, and the filtered water can be retained in the top part of the apparatus for any length of time. Having briefly described the nature of my invention, it remains for me to add, that it is an application of the hydrostatic paradox to the filtration of water, the nature of which admits of its being extended to any magnitude. For example, at the house where my first experiment was tried, the altitude of the cistern was 35 feet, and the area of the stone contained 113 square inches, which sustained an upward pressure from the column of water in the pipe, P, of 1853 pounds, and the product of filtration was at the rate of half a gallon per minute; and since the altitude of the pipe into the area of the stone proportions the quantity, it is a simple question to find what area and altitude together would produce 10, 20, or 100 gallons of filtered water every minute. To produce such effects, a number of stones must be used in the same machine. I believe it yet remains to be proved whether filtered water preserves as well at sea as that which is not filtered. I conceive it will be found to keep equally well, or perhaps better, as filtration removes all animal and vegetable matter which it holds in suspension, the former frequently both in a live and putrid state, a circumstance which cannot reasonably have any tendency to preserve water. Should experience prove that my hypotheses are correct, I would propose, for the benefit of the public in general, and the shipping interest, that a machine on a large scale should be erected at every sea port, where ships are in the practice of taking water, which should be sent at once filtered to sea."

[*Brewster's Journal.*

Account of the Raising of three Stranded Vessels.

Sir,—Several papers have appeared in your Magazine, proposing plans for raising stranded ships. Some of them may, perhaps, be found to possess merit, should any one be inclined to try them; others are somewhat similar to the famous plan of belling the cat, where the only question was who should carry it into effect?

As it may be of use to some of your readers, I will, with your permission, describe to you three plans which I have used with success, in raising stranded vessels.

In 1821, I was employed to float a vessel of 240 tons, which had lost her keel, deadwood, and the lower part of her sternpost. The flat of her footwaling was all gone, and she lay so that there was

three feet water in her at low water. Her two ends and sides were in good condition. In this case I laid a platform in the hold, about one foot above low-water mark; I then calked the platform and foot-waling up to the lower deck clamps, and shored the platform from the beams. The whole of this work occupied about five days. When it was completed, and the water stopped out, the vessel floated, and was then taken to Ipswich, where she was broken up.

Before I adopted this mode of raising her, I tried the plan (about which so much noise has been recently made) of floating her by means of casks attached to her below the surface of the water, but after trying it, without success, for two or three tides, I gave it up. I found, that although I had got as much lifting power by calculation as was required, yet I could not possibly prevent the casks staving each others' heads, or bilging, by the agitation of the sea, when they were in the hold, the pressure of the lower ones bursting those above them, &c.

The next method is one which I used in taking a sloop of about 70 tons register off the beach near Orford. She was lying imbedded in the shingle up to her wales, and, by striking, the stem and stern-posts were loosened, and several planks started. This, however, I did not know at the time, but I observed that the water rose inside and out to the same height. From the appearances inside, I discovered that the two ends were much shaken, although the bottom did not appear to be greatly injured, from the general appearance of the inside plank. As I could not ascertain the precise extent or nature of the injury the vessel had sustained, I used the following method of floating her—for I have generally found that the safe plan has been the most economical in the end. The midship section of a ship approaches to the form of an inverted arch; I saw that the inside plank for a certain extent in the midships was good; this I had calked, and a strong bulkhead, or partition, fitted at each end, which was also made water-tight, and shored in a diagonal direction to the beams and sides of the vessel. The pressure of the water upwards tended to compress the edges of the inside planks closer together; therefore, they did not require to be shored down, for so long as they did not materially decrease in volume, there was no risk of their being forced inwards so as to endanger the safety of the vessel. Just as the bulkheads were completed and ready for shoring, a heavy gale of wind came on, which lasted three days, during which the vessel was driven about a quarter of a mile along the beach, and would, I have no doubt, have gone to pieces, but for the additional strength which the bulkheads gave her to sustain the violence of the seas. The next tide after the gale abated, the damages were repaired, the ship was floated off, and in the course of a few days removed to Ipswich, where she was repaired. It is not often that vessels are stranded so as to allow this plan to be pursued; but where it can be adopted, it is decidedly the most economical, and perfectly safe.

Last year I was engaged in floating a vessel of about 210 tons register, which had been ashore on the Gun fleet sand, where she had struck with so much violence upon a wreck, previously sunk in

the sand, as to carry away all her keel, lower piece of stem, dead-wood, and the lower part of the sternpost; several of the after-floors and futtocks were also gone, and the larboard quarter was stove in, to within three streaks of the wales. The after part of the keelson, and the floors attached to it, were raised up at least three feet from their proper position, and in fact, the hull below the lower deck was quite disjointed. She lay in such a situation, that we were able to work from three to four hours, at each low water. I began operations, by placing a tier of beams across about six feet below the lower deck; upon these I laid a platform of deals, which were calked, and made tight; at the forepart of the vessel, a strong bulkhead or partition was erected and calked, and a similar one abaft. I covered the opening in the larboard quarter with deals inside, and calked them. I then had a number of iron bolts made, with a screw at one end, and a broad flap at the other to receive two bolts; these rods were screwed into the keelson and floors at such places as required support, and were bolted at the other end to the beams; after this was all done, I began the shoring. (The topsides of this vessel were but little strained, and the fastenings of the lower deck were uninjured.) I formed, by means of diagonal braces and shores, each pair of beams into a trussed frame. I then placed deals across the platform or spar deck, and fitted perpendicular shores, so that each shore had to sustain the upward pressure of about twelve superficial feet of the spar deck; the bulkheads and quarters were secured in a similar manner, with perpendicular and diagonal shores, which were abutted against firm supports. All the shores were so fitted, that any one of them might be removed, if necessary, to stop a leak. On the fourth day after commencing operations, I had the satisfaction of seeing her afloat, when she was conveyed round to Ipswich, and repaired.

I am aware that there is nothing new in the plans which I have used for floating ships, but as I thought the communication of them to you might, perhaps, be the means of frequently saving a valuable ship from becoming a total wreck, I have ventured to describe them; for it is not the mass of information which we possess, but its appli-tion, which renders it useful.

I am, sir, yours, &c.

GEORGE BAYLEY.

Ipswich, March 31, 1829.

[*London Mechanics Magazine.*

On a method of Rendering Platina Malleable. By WILLIAM HYDE WOLLASTON, M. D. F. R. S. *&c.*

[From the Philosophical Transactions for 1829. Part I.]

As, from long experience, I probably am better acquainted with the treatment of platina, so as to render it perfectly malleable, than any other member of this society, I will endeavour to describe, as briefly as is consistent with perspicuity, the processes which I put in

practice for this purpose, during a series of years, without seeing any occasion to wish for further improvement.

The usual means of giving chemical purity to this metal, by solution in aqua regia and precipitation with sal ammoniac, are known to every chemist; but I doubt whether sufficient care is usually taken to avoid dissolving the iridium contained in the ore, by due dilution of the solvent. In an account which I gave in the Philosophical Transactions for 1804, of a new metal, rhodium, contained in crude platina, I have mentioned this precaution, but omitted to state to what degree the acids should be diluted. I now, therefore, recommend, that to every measure of the strongest muriatic acid employed, there be added an equal measure of water; and, moreover, that the nitric acid used be what is called "single aqua fortis;" as well for the sake of obtaining a purer result, as of economy in the purchase of nitric acid.

With regard to the proportions in which the acids are to be used, I may say, in round numbers, that muriatic acid, equivalent to 150 marble, together with nitric acid, equivalent to 40 marble, will take 100 of crude platina; but in order to avoid waste of acid, and also to render the solution purer, there should be in the menstruum a redundance of 20 per cent. at least of the ore. The acids should be allowed to digest three or four days, with a heat which ought gradually to be raised. The solution, being then poured off, should be suffered to stand until a quantity of fine pulverulent ore of iridium, suspended in the liquid, has completely subsided; and should then be mixed with 41 parts of sal ammoniac, dissolved in about five times their weight of water. The first precipitate, which will thus be obtained, will weigh about 165 parts, and will yield about 66 parts of pure platina.

As the mother liquor will still contain about 11 parts of platina, these, with some of the other metals yet held in solution, are to be recovered, by precipitation, from the liquor with clean bars of iron, and the precipitate is to be redissolved in a proportionate quantity of aqua regia, similar in its composition to that above directed to be used: but in this case, before adding sal ammoniac, about 1 part by measure of strong muriatic acid should be mixed with 32 parts by measure of the nitro-muriatic solution, to prevent any precipitation of palladium or lead along with the ammonio-muriate of platina.

The yellow precipitate must be well washed, in order to free it from the various impurities which are known to be contained in the complicated ore in question; and must ultimately be well pressed, in order to remove the last remnant of the washings. It is next to be heated, with the utmost caution, in a black-lead pot, with so low a heat as just to expel the whole of the sal ammoniac, and to occasion the particles of platina to cohere as little as possible; for on this depends the ultimate ductility of the product.

The gray product of platina, when turned out of the crucible, if prepared with due caution, will be found lightly coherent, and must then be rubbed between the hands of the operator, in order to procure by the gentlest means, as much as can possibly be so obtained,

of metallic powder, so fine as to pass through a fine lawn sieve. The coarser parts are then to be ground in a wooden bowl with a wooden pestle, but on no account with any harder material, capable of burnishing the particles of platina;* since every degree of burnishing will prevent the particles from cohering in the further stages of the process. Since the whole will require to be well washed in clean water, the operator, in the latter stages of grinding, will find his work much facilitated by the addition of water, in order to remove the finer portions, as soon as they are sufficiently reduced to be suspended in it.

Those who would view this subject scientifically, should here consider, that as platina cannot be fused by the utmost heat of our furnaces, and, consequently, cannot be freed like other metals, from its impurities, during igneous fusion, by fluxes, nor be rendered homogeneous by liquefaction, the mechanical diffusion through water should here be made to answer, as far as may be, the purposes of melting; in allowing earthy matters to come to the surface by their superior lightness, and in making the solvent powers of water effect, as far as possible, the purifying powers of borax and other fluxes in removing soluble oxides.

By repeated washing, shaking, and decanting, the finer parts of the gray powder of platina may be obtained as pure† as other metals are rendered by the various processes of ordinary metallurgy; and if now poured over, and allowed to subside in a clean basin, a uniform mud or pulp will be obtained, ready for the further process of casting.

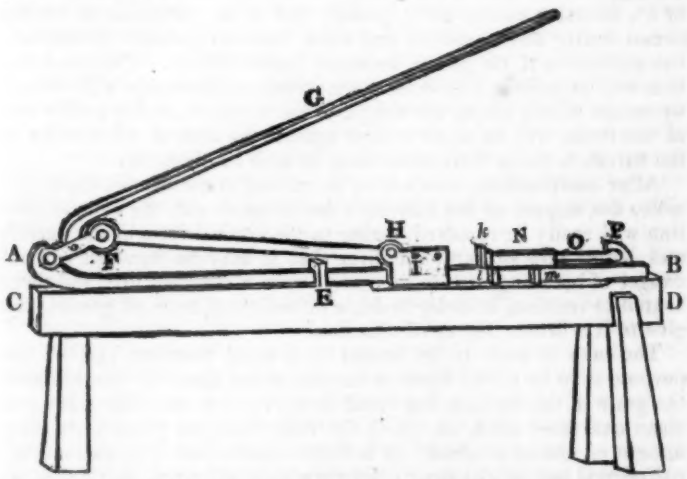
The mould which I have used for casting, is a brass barrel, 6¾ inches long, turned rather taper within, with a view to facilitate the extraction of the ingot to be formed, being 1.12 inches in diameter at top, and 1.23 inches at a quarter of an inch from the bottom, and plugged at its larger extremity with a stopper of steel, that enters the barrel to the depth of a quarter of an inch. The inside of the mould being now well greased with a little lard, and the stopper being fitted tight into the barrel by surrounding it with blotting-paper, (for the paper facilitates the extraction of the stopper, and allows the escape of water during compression,) the barrel is to be set upright in a jug of water, and is itself to be filled with that fluid. It is next to be filled quite full with the mud of platina; which, subsiding to the bottom of the water, is sure to fill the barrel without

* The following experiment will prove the necessity of attending to this precaution:—if a wire of platina be divided with a sharp tool in a slanting direction, and, being then heated to redness, be struck upon an anvil with a hammer, so as to force into contact the two newly divided surfaces, they will become firmly welded together; but if the surfaces have previously been burnished with any hard substance, the welding will be effected, if at all, with very great difficulty.

When the powder of platina has been over-heated in decomposing the ammonio-muriate, or has been burnished in the grinding, I have in vain endeavoured to give it a welding surface, by steeping it in a solution of sal ammoniac in nitric acid.

† Sulphuric acid, digested upon the gray powder of platina, thus purified, extracted less than 1-1000dth part of iron.

cavities, and with uniformity,—a uniformity to be rendered perfect by subsequent pressure. In order, however, to guard effectually against cavities, the barrel may be weighed after filling it, and the actual weight of its contents being thus ascertained, may be compared with that weight of platina and water which it is known by estimate that the barrel ought to contain.* A circular piece of soft paper first, and then of woollen cloth, being laid upon the surface, allow the water to pass, during partial compression, by the force of the hand with a wooden plug. A circular plate of copper is then placed upon the top, and thus sufficient consistency is given to the contents to allow of the barrel being laid horizontally in a forcible press.



The press which I have generally used for this purpose, consists of a flat iron bar, AB, set edgeways, and screwed down by a hook, E, near its middle, where it would otherwise be liable to bend, to a strong wooden bench, CD. The bar is connected by a pivot at its extremity, A, with the lever AFG. An iron rod, FH, which turns at its two extremities upon the pivots F and H, proceeds from the lever at F, and, as the lever descends, propels forward the carriage, I, which slides along the bar. A stopper, or block, being placed in

* From the mean weight of the ingots obtained in previous operations, it is known that the barrel described in the text ought to contain 16 ounces troy of dry platina powder. The weight of the contents of the barrel $=$ 16 ounces $\times$ $\frac{\text{sp. grav. of platina} - 1}{\text{sp. grav. of platina}}$ $+$ the weight of a cubic inch of water $\times$ capacity of the barrel in cubic inches $=$ 16 ounces $\times$ $\frac{20.25}{21.25}$ $+$ ·526 ounces $\times$ 7.05 $=$ 18.9375 ounces troy. Should the contents of the barrel weigh materially less than this estimated weight, there must be a want of uniformity in the disposition of the powder within the barrel.

the vacant space, *Ik*, the carriage communicates motion to the cradle, *klm*, which is also made to slide along the bar, and carries the barrel, N, which lies upon the cradle, straight against the piston, O, which rests by its end against P, a projection in the further extremity of the bar.

The weight, which in this machine, when the angle of the lever's elevation is small, will keep the power, applied vertically at the extremity of the lever, *in equilibrio* = that power $\times \frac{AG \times FH}{AF[AF+FH]}$ × cotan. of the angle of the lever's elevation; which expression, in the case of the press actually used, becomes, power × 5. cotan. of the angle of the lever's elevation. This expression, at an elevation of 5°, becomes nearly 60 × power, and at an elevation of 1°, becomes nearly 300 × power; and when the lever becomes horizontal, the multiplier of the power becomes *quasi* infinite. This explanation will be sufficient to show the mechanical advantage with which, by means of this press, the weight of the operator, acting on the end of the lever, will be made to bear against the area of the section of the barrel, a circle little more than an inch in diameter.

After compression, which is to be carried to the utmost limit possible, the stopper at the extremity being taken out, the cake of platina will easily be removed, owing to the conical form of the barrel; and being now so hard and firm that it may be handled without danger of breaking, it is to be placed upon a charcoal fire, and there heated to redness, in order to drive off moisture, burn off grease, and give to it a firmer degree of cohesion.

The cake is next to be heated in a wind furnace; and for this purpose is to be raised upon an earthen stand about $2\frac{1}{2}$ inches above the grate of the furnace, the stand being strown over with a layer of clean quartzose sand, on which the cake is to be placed, standing upright on one of its ends. It is then to be covered with an inverted cylindrical pot, of the most refractory crucible ware, resting at its open end upon the layer of sand; and care is to be taken that the sides of the pot do not touch the cake.

To prevent the blistering of the platina by heat, which is the usual defect of this metal in its manufactured state, it is essential to expose the cake to the most intense heat that a wind furnace can be made to receive, more intense than the platina can well be required to bear under any subsequent treatment; so that all impurities may be totally driven off, which any lower temperature might otherwise render volatile. The furnace is to be fed with Staffordshire coke, and the action of the fire is to be continued for about twenty minutes from the time of lighting it, a breathing heat being maintained during the last four or five minutes.

The cake is now to be removed from the furnace, and being placed upright upon an anvil, is to be struck, while hot, on the top, with a heavy hammer, so as at one heating effectually to close the metal. If in this process of forging, the cylinder should become bent, it should on no account be hammered on the side, by which treatment it would be cracked irremediably; but must be straightened by blows

upon the extremities, dexterously directed, so as to reduce to a straight line the parts which project.

The work of the operator is now so far complete, that the ingot of platina may be reduced, by the processes of heating and forging, like that of any other metal, to any form that may be required. After forging, the ingot is to be cleaned from the ferruginous scales which its surface is apt to contract in the fire, by smearing over its surface with a moistened mixture of equal parts by measure of crystallized borax and common salt of tartar, which, when in fusion, is a ready solvent of such impurities,* and then exposing it, upon a platina tray, under an inverted pot, to the heat of a wind furnace. The ingot, on being taken out of the furnace, is immediately to be plunged into dilute sulphuric acid, which, in the course of a few hours, will entirely dissolve the flux adhering to the surface. The ingot may then be flattened into leaf, drawn into wire, or submitted to any of the processes of which the most ductile metals are capable.

The perfection of the methods above described, for giving to platina complete malleability, will best be estimated by comparing the metal thus obtained, in respect of its specific gravity, with platina which has undergone complete fusion; and by comparing it, in respect of its tenacity, with other metals possessing that quality in the greatest perfection.

The specific gravity of platina, drawn into fine wire, from a button which had been completely fused by the late Dr. E. D. Clarke with an oxy-hydrogen blow-pipe, I found to be 21.16. The aggregate specific gravity of the cake of metallic mud, when first introduced into the barrel, exclusively of moisture, is about 4.3; when taken from the press, is about 10. That of the cake fully contracted, on being taken out of the wind furnace before forging, is from 17 to 17.7. The mean specific gravity of the platina, after forging, is about 21.25, although that of some rods, after being drawn, is 21.4: but that of fine platina wire, determined by comparing the weight of a given length of it with the weight of an equal length of gold wire drawn through the same hole, I find to be 21.5, which is the maximum specific gravity that we can well expect to be given to platina.

The mean tenacity, determined by the weights required to break them, of two fine platina wires, the one of $\frac{1}{3000}$, the other of $\frac{1}{3850}$ of an inch in diameter, reduced to the standard of a wire $\frac{1}{10}$th of an inch in diameter, I found to be 409 pounds; and the mean tenacity of 11 wires, beginning with $\frac{1}{4300}$ and ending with $\frac{1}{25.000}$ of an inch,

* The chemist will find this flux very serviceable for removing from his crucible, or other vessels of platina, those ferruginous scales with which, after long use, and particularly after being strongly heated in a coal or coke fire, they become incrusted. In the analysis of earthy minerals, I have been in the habit of using a similar flux, composed of 2 parts by weight of crystallized carbonate of soda, and 1 of crystallized borax, well ground together. It has the advantage of not acting, like caustic alkali, upon the platina crucible, and is a powerful solvent of jargon and many other minerals, which yield with difficulty to other fluxes. If the mineral to be operated on requires oxidation, in order to decompose it, a little nitre or nitrate of soda may be added.

reduced to the former standard, I found to be 589 pounds; the maximum of these 11 cases being 645 pounds, and the minimum 480 pounds. The coarsest and the finest wire which I tried, present exceptions, since a wire of $\frac{1}{1500}$ of an inch gave 290 pounds, and a wire of $\frac{1}{30.000}$ of an inch, 190 pounds. If we take 590 pounds, as determined by the 11 consecutive trials, to be the measure of the tenacity of the platina prepared by the processes above described, and consider that the tenacity of gold wire, reduced to the same standard, is about 500, and that of iron wire, 600, we shall have full reason to be satisfied with the processes detailed in the present paper, by which platina has been rendered malleable.

To this paper I beg to subjoin an account of some processes relating to two of the metals which are found in the ore of platina.

To obtain malleable palladium, the residuum obtained from burning the prussiate of that metal is to be combined with sulphur, and each cake of the sulphuret, after being fused, is to be finally purified by cupellation, in an open crucible, with borax and a little nitre. The sulphuret is then to be roasted, at a low red heat, on a flat brick, and pressed, when reduced to a pasty consistence, into a square, or oblong, and perfectly flat cake. It is again to be roasted very patiently, at a low red heat, until it becomes spongy on the surface. During this process, sulphur flies off in the state of sulphurous acid, especially at those moments when the heat is allowed occasionally to subside. The ingot is then to be cooled; and when quite cold, is to be tapped with a light hammer, in order to condense and beat down the spongy excrescences on its surface. The alternate roastings and tappings (or gentle hammerings) require the utmost patience and perseverance, before the cake can be brought to bear hard blows: but it may, by these means, at length be made so flat and square, as to bear being passed through the flatting mill, and so laminated to any required degree of thinness.

Thus prepared, it is always brittle, while hot; possibly, from its still containing a small remnant of sulphur. I have also fused some palladium *per se*, without using sulphur; but I have always found it, when treated in this way, so hard and difficult to manage, that I greatly prefer the former process.

To obtain the oxide of osmium in a pure, solid, and crystallized state, I grind together, and introduce, when ground, into a cold crucible, 3 parts by weight of the pulverulent ore of iridium, and 1 part of nitre. The crucible is to be heated to a good red in an open fire, until the ingredients are reduced to a pasty state; when osmic fumes will be found to arise from it. The soluble parts of the mixture are then to be dissolved in the smallest quantity of water necessary for the purpose, and the liquor, thus obtained, is to be mixed, in a retort, with so much sulphuric acid, diluted with its weight of water, as is equivalent to the potash contained in the nitre employed; but no inconvenience will result from using an excess of sulphuric acid. By distilling rapidly into a clean receiver, for so long a time

as the osmic fumes continue to come over, the oxide will be collected in the form of a white crust on the sides of the receiver; and there melting, it will run down in drops beneath the watery solution, forming a fluid flattened globule at the bottom. When the receiver has become quite cold, the oxide will become solid and crystallize. One such operation has yielded 30 grains of the crystallized oxide, besides a strong aqueous solution of it.

Observations on the manner of Manufacturing Indigo in the Southern Provinces of India; with some Remarks on its Chemical Changes and Combinations. *By* CHARLES H. WESTON, Esq.

DR. BANCROFT introduces his observations on indigo by the following strong expressions: "The subject of this article is the most interesting, important, and instructive, which can occupy the attention of a dyer or a chemist; the admirable and singular properties of indigo being only surpassed by those of the colouring matter of the murex and the buccinum a little, while it is of much higher practical utility than the latter."* Perhaps there are few men better qualified to form an estimate on this point than Dr. Bancroft, who had removed from the art of dying generally so much that obscured it, and had thrown so much light on the changes and chemical characters of indigo in particular.

Not only, however, has it claims, from its peculiar chemical characters, upon the attention of the scientific man, but the important part it now holds in our exports from India, must also interest the man of business in its favour. The indigo of the East Indies, which at one time ranked so low in its comparative value, has, by a better mode of manufacture, been progressively improving, and, consequently, as gradually making its way into European markets, till, at length, the exports of the West, of Spanish America, and the West Indies, have been to a great extent transferred to the East.† This is a conquest indeed, but it is a conquest which English *intelligence*, as well as enterprise, has accomplished. To those, therefore, in whose minds the bare mention of the word "theory" is but too apt to call into action every latent prejudice, and to secure to it the most determined opposition, this very striking instance before us, among many others which are daily occurring, of the great advantages resulting from the combined assistance of theory and practice, should lead such, at least, to question the propriety of their hatred to all theoretical knowledge. The tendency of scientific information, as it lays open causes and effects, is, to point out what parts of the process are superfluous, and what may be improved; and, "in proportion as science advances, all the principles become less compli-

* *Vide* "Experimental Researches concerning the Philosophy of Permanent Colours." By Dr. Bancroft.

† It is, I believe, computed that British India supplies three-fourths of all the indigo brought into European markets.

cated, and, consequently, more useful; and it is then that their *application* is most advantageously made to the arts."* In the following remarks, I shall endeavour to bear in mind the comparative value of both theory and practice.

There will be no occasion for me to make any remarks upon the botanical characteristics of the indigofera tinctoria, as they are already so well known.† Upon the *mode*, however, of manufacturing, or rather of separating, the valuable dye from the indigo leaves, something, it appears to me, need be said; inasmuch, as in works written professedly upon this subject, I have only met with one method of conducting this process, namely, the green or fermenting process; by which is intended the *fermentation* of the plant fresh cut and green in vats properly prepared for the purpose. There is another method the very reverse of this, the production of indigo from the *dried* leaves of the plant *without* fermentation; and this is the method which is to be the subject of the following remarks.

I shall slightly touch upon the cultivation and growth of the plant, making a few observations on its peculiar structure, and its wonderful adaptation, both to the climate and the soil in which it is destined to exist.

Immediately after the great periodical fall of rain, which takes place during the monsoon months of the latter part of October, November, and the beginning of December, the ground is ploughed up and properly prepared for the reception of the seed. The time of sowing will, of course, depend on local situation—the elevated parts sowed before the monsoon has quite passed by, while, from fear of inundation, the low tracts remain untouched till a later period.

The plant requires a light soil, little, but timely rain, and much sunshine. Rain should fall immediately after the plant shows itself above the ground, for by it the plant is not only invigorated, but cleansed from those innumerable insects, which otherwise would have fed upon, and destroyed the leaves.

From this time, comparatively little rain is required, if it fall opportunely, that is, at the different stages of the growth of the plant. After the first cutting of the branches, it sickens, and at that period rain is particularly necessary for its proper restoration. The same remarks will, of course, apply to the like periods between the other cuttings.

This plant, unlike the Bengal plant, is only made use of for *one* year, during which the branches are cut off from the stem three or four times, after which the ground is ploughed up for another sowing. But each successive growth of the branches produces an increased deterioration of the qualities of the leaves; so that one part of the leaves of the first cutting would yield as much indigo as two parts of the third crop.

The produce of the leaves is very precarious, for excessive rain is

* *Vide* "Elements of Agricultural Chemistry." By sir H. Davy.

† See the botanical characters of the indigofera genus in Rees's Cyclopedia, and their classification by Dr. Bancroft.

almost as destructive of the *properties* of the plant, as continued drought is of the plant itself. The rapidity of the growth of plants during much rain, in the temperature of the tropics, is extraordinary, and a proportionate deficiency in all that characterizes the vegetable world necessarily follows. This we find to be the case with all forced vegetables; and the mildness of the radish of hastened growth, when contrasted with the highly pungent and almost acrid flavour of the slowly and gradually advanced one, may be adduced as explanatory of this observation. Besides this general remark, however, there are other considerations in some measure peculiar to this plant. Indigo contains an extraordinary quantity of carbon, to obtain more or less of which carbonic acid gas must be decomposed; the plant retaining the carbon, and transpiring pure oxygen gas.* But as this important change can only be effected when the plant is under the direct and immediate influence of light, rainy weather, by intercepting the sun's rays, prevents the accomplishment of this very important part of vegetable economy. Hence it is, as is practically well known to manufacturers, that the indigo plant, however fine and luxuriant, as is the natural result of much rain, is very deficient in *produce*, and a similar loss is experienced even if the plant, without the fall of too much rain, has grown up under *cloudy* weather. Sunshine, much and continued sunshine, is essentially necessary for the proper exercise of those secretory organs by which this peculiar drug is formed and perfected.

This plant is destined, therefore, to exist under a burning sun and much deficiency of rain; how then is it to obtain its necessary supply of water? Nature, who invariably so well adapts the means to the end, has, in this instance, displayed her usual wisdom. The root, instead of being short, and branching off in different directions, and reaching to various depths, is one continuation of the stalk, which, decreasing gradually to a point, after the manner of the common garden radish, descends perpendicularly into the ground, to the depth of about three feet. While, therefore, the plant is necessarily exposed to the continued heat of a broiling sun, it is deriving benefit from the moisture of that part of the soil, which always remains uninfluenced by any external heat. I before stated that the nature of the soil should be light and sandy; and the non-conducting powers of the sand, in reference to caloric, afford a sufficient reason for the complete protection of the root. I have often found that, while the surface at mid-day was too hot to allow the hand to remain in contact with it, the temperature of the sand, at even a short distance beneath the surface, was gratefully cool.†

* There are, indeed, some plants which must derive the *whole* of their carbon from the atmosphere. Sir H. Davy remarks, "many plants that grow upon rocks or soils containing no carbonic matter, can only be supposed to acquire their charcoal from the carbonic acid gas in the atmosphere." In the sandy soil of India there certainly cannot be enough of vegetable matter to supply a proper proportion of carbon.

† A good instance of the non-conducting power of sand is given in the following extract:—"The red hot balls employed by the garrison of Gibraltar to destroy the Spanish floating batteries, were carried from the furnaces to the bastions in *wooden* barrows, with only a layer of sand interposed, and this was

There remains another reason why the plant can endure drought so continued. As dew is the condensation of the aqueous vapours exhaled by the sun during the day, the quantity of dew, *cæteris paribus*, will always be in the direct ratio of such heat; and hence it is, that, in clear, still nights, after such unclouded weather, the fall of dew within the tropics is immense. Now, this water, so precipitated during the absence of the sun, completely envelops the entire plant, and is copiously taken up by those absorbing vessels, which form a part of the wonderful physical structure of the leaves of plants. Thus is it constantly restored to the full exercise of all its powers, ready to receive the renewed action of the sun's rays, so necessary for effectuating the decomposing process before mentioned.*

But plants, like animals, transpire, as well as absorb, moisture, and equally vary in their power of doing so. Less quantity of water is, therefore, necessary for the growth of one genus of plants, whose transpiration is limited, than for the wants of those of another genus, whose transpiration is more extensive.† Now, although the extent of transpiration may be dependant upon, and be in proportion to, the absorption of water, and *vice versa*; and, therefore, as the absorption is extensive, the transpiration must be so likewise;‡ yet may there not be some *balance* in favour of the absorbing powers over the transpiratory powers of the plant?§ These appear to be some of the methods which nature adopts to meet those apparent difficulties, the continuance of an unclouded sky, and the constant and necessary supply of water.

It may be further remarked, that in the growth and formation of this plant, beside the water essential to the solution, or carrying in suspension different vegetable, alkaline, or earthy substances, to the plant—much water is not wanted: because, as hydrogen in the ultimate products of indigo,‖ forms rather an unimportant part, the decomposition of water must be proportionably limited.

found sufficient to prevent the balls, though in a high state of incandescence, from setting fire to the wood."—*Tilloch's Philosophical Magazine.*

* "In very intense heats, when the soil is dry, the life of the plants seems to be preserved by the absorbent power of their leaves; and it is a beautiful circumstance in the economy of nature, that the aqueous vapours are most abundant in the atmosphere, when they are most needed for the purposes of life."—*Davy's Agricul. Chemistry.*

† *Vide* Ure's Chemical Dictionary, article "Vegetable Kingdom," and Brande's Manual of Chemistry, vol. i.

‡ See this stated in Dr. Thomson's extensive observations upon "Vegetables," in his system of Chemistry.

§ We learn from Mr. Bonnet's "Researches concerning the Use of Leaves," the great extent to which vegetation can be carried by the water absorbed *solely* by the leaves, although *transpiration* was, at the same time, going forward. (*Vide* Thomson.)

‖ These, according to Dr. Ure, are—

Carbon - - -	71.37
Oxygen - - - -	14.25
Hydrogen - - -	4.38
Azote - - - -	10.
	100.

We now return to the cultivation of the plant, and view it as gradually advancing to maturity. As it approaches this period, the colour of the leaves changes from a light to a dark green—yet this change is not gradual, but is quickly acquired a short time before the branches are fit to be cut. Much judgment on this point is required, for the evils arising from premature cutting are great, and much of the good effects of antecedently seasonable weather would be neutralized by such a mistake. The consequences are, a deficiency of produce, and an unequal absorption of oxygen in the beating vat. When the plant is fully matured, the branches are severed from the parent stem early in the morning, and spread out in the sun till the afternoon. By this time they are so desiccated, that the leaves are easily separated from the branches, by simply beating them with a stick. The leaves, so separated, are housed in warehouses, closely packed, and well trodden down by natives.

The importance of *properly drying* the leaves, will be easily understood, when we learn that the leaves are not immediately used, but are kept so packed for one month. Moisture very soon produces fermentation, involving either a partial or total destruction of the colouring matter. Deficiency of produce, is, of course, the natural result of such change, and where no such bad effects have been felt, the use of *ill-dried*, or green leaves, produces an effect in the beating vat, similar to that which is consequential on premature cutting.

The leaves, however, when properly dried, do not remain for one month without suffering a very *material change*, and accomplishing a very important object. We find, at the expiration of this period, that the colour of the leaves has passed into a *light lead colour;* by additional keeping, the lead colour gradually darkens until it becomes black. Experience has found that the leaves will not give out any colouring matter to cold water, until the first change has commenced to take place,—that the maximum quantity of indigo is to be obtained when the lead colour is effected, and that, from this period, a loss in the quantity of indigo always accompanies, and is in proportion to the extent of such further changes. But, perhaps, the *necessity* of keeping the leaves, and the *nature* of the important change so accomplished during that period, will be better proved and elucidated by a perusal of some memoranda of a few experiments I made in India.

No. 1. "Digested some *green* indigo leaves from the plant, fit for immediate cutting, in *cold* water, for twenty-five minutes;—the slightest *yellowish* extract, only, was produced.

2. "*Green* mango, and other leaves, digested in cold water for two hours, gave no extract.

3. "*Green* mango, and other leaves, *boiled* for an hour and a quarter, gave a clear reddish brandy colour to the water, and the leaves of a creeping plant similarly steeped, produced a yellow tinged with green, not clear, but leaving a sediment.

4. "Boiled the *green* indigo leaves taken from a plant fit for *immediate* cutting, for two hours and ten minutes. The liquor was

decidedly a *greenish* yellow. This left on the filter the *smallest* quantity of indigo, and the solution, after twenty-four hours, became darker, and a little more indigo was precipitated. Both precipitates, however, most inconsiderable.

5. "Green solution of indigo in cold water, prepared from the *dried* leaves taken from the heap which had been one month in the warehouse, was kept in rapid ebullition for one hour, and water was added to supply the loss by evaporation;—the *whole* of the indigo was precipitated, and the supernatant liquor was of a clear dark morone colour.*
6. "Indigo leaves, taken from the ripe plant (part of which was used in experiment No. 1,) after *ten days' keeping*, gave to the *cold* water, in which they were digested for twenty-five minutes, a fine *grass green colour.*
7. "Mango, and other leaves, well *dried* and *kept* spread out on paper for ten days, gave to *cold* water a deep brandy colour.
8. "*Boiled* for a short time, some *green* leaves taken from the ripe indigo plant, and obtained, by filtration, a brandy colour solution with a greenish tinge: half part of which (No. 1,) was exposed to the air, and the other half (No. 2,) was poured back over the leaves equally exposed to the air: No. 1 remained unchanged, and, when boiled, became only a darker brown, and gave no precipitation of indigo: No. 2 subsequently *fermented*, and *afterwards* became a good green.
9. "Green leaves, digested in *cold* water for one-quarter of an hour, filtered, and kept exposed to the action of the atmosphere for fourteen hours, remained *unchanged.*

Cold water, allowed to *remain on the leaves* for fourteen hours, became green."

Now, the legitimate inferences to be deduced from these experiments, I conceive to be these:—

1. That as the green leaves of plants give no colour, and the leaves of the indigo plant no blue colouring matter to water by simple infusion, (Exp. 1 and 2,) and the same leaves, after desiccation, and exposure to the atmosphere for many days, will, under the same circumstances, give out what is essentially the colouring matter of the leaves (Exp. 5, 6, and 7,) the warehousing the indigo leaves for procuring indigo by the dry process is *necessary.*
2. That the blue principle does *not* exist in the leaves *ready formed*, or in a state of separation, (Exp. 8 and 9,) but requires some new arrangement of its component parts to effect such separation;—and,
3. That the *absorption of oxygen* is necessary either to produce such new arrangements, or to complete some incipient arrangement of its constituent parts (Exp. 4, 5; No. 2 of 8 and 9,) and, so to separate the blue extract, as to make it soluble in water, and, therefore, the *change* effected by one month's keeping, seems occasioned by an *absorption of oxygen.* [*Quarterly Journal.*

[TO BE CONTINUED.]

* The effects of boiling upon this supernatant liquor will be mentioned hereafter.

On the Construction of Fire-proof Buildings. *By* Ignatius Bonomi, Architect.

One great, and perhaps the principal cause of the destructiveness of fires in large buildings, is the want of arched surfaces of incombustible materials. This has been disastrously exemplified in the destruction of the choir of York Minster, where the roofs of the aisles, which are solidly arched with stone, suffered no injury; while the choir-roof, although much more raised above the action of the fire, has been entirely destroyed by it: and there is little doubt but that the whole roof of the church would have suffered the same fate, if its continuity had not been interrupted by the walls of the tower.

The use of arched surfaces of solid materials cannot be too strongly recommended. In no part of our church architecture is the skill of the contrivers so conspicuous, as in the art employed in the construction of the vaulting, in order to procure strength and reduce the lateral pressure, which they effected by a frame-work of stone, of sufficient depth, converging towards the points of support, and by filling in the intervals with thinner material. They thus imitated the structure of the vegetable leaf, in which the fibres centre upon the stem, as the ribs or frame-work of the arch on its support; at which point, also, the buttress meets the ribs, to counteract the lateral thrust.

In many instances, to render the construction lighter, surfaces of *brick* are used between the stone ribs; and, where extreme lightness is required, *hollow pots* (cylindrical within) of well burnt clay, would prove an excellent substitute for bricks. The use of these was not unknown to the Romans, who also employed *pumice;* this porous material possessing the additional advantage, when combined with good cement, of rendering the arched surface one united petrification, opposing (in consequence of its firm union) little lateral pressure, comparatively, against the sustaining walls.

A very frequent occasion of fire is the frequent necessity for the repair of *lead gutters*, which requires the use of braziers on the roof. This necessity would, in a great degree, be obviated by the adoption of gutters of *cast-iron*, or of *solid lead* cast in troughs, and having spouts at proper intervals to carry off the water. The action of the sun upon gutters, which, by expanding the metal, is the principal cause of their failure, might also be much diminished by a thin covering of stone or slate, sufficiently perforated for the percolation of water. This contrivance would also have the advantage of preventing the lodgment of snow, which is apt to freeze in the gutters and occasion the water to overflow, to the damage of the building, and particularly of the timbering of the roof.

Another cause of fire, is, the use of roofs of timber, especially when connected with the roofs of other buildings. In such cases the substitution of *iron* for wood would afford security; and if, in the use of iron, care is taken to make the rise or pitch of the roof sufficient to prevent indirect strains, and to *tie in* the feet of the

main supports or triangles, there can be no danger of failure, provided the strength of the iron is proportioned to the weight it has to carry. If, however, the building has an arched under roof of solid materials, and care is taken to prevent the necessity of continual repairs to the lead-work, the danger of fire, even from a roof of timber, is very considerably obviated. In adverting to the use of a substitute for wooden roofs, it may be proper to specify that in some instances the slated surface might be carried upon *cross walls*, supported by the arches and divisional works of the building.

In a paper written for the express purpose of recommending precautions against fire in the construction of public buildings, it will hardly be deemed foreign to the purpose to state the impropriety of collecting into one room great numbers of books, or works of art. Even if security is obtained against fire from without, there is always danger to be apprehended from the use of lights within; and one spark igniting might occasion the destruction of the whole contents. The present collocation of the libraries of the advocates and writers to the signet in Edinburgh, presents a striking instance of this kind of risk.

The means which may be recommended for securing such valuable collections from destruction by fire, are, in the first place, to use *incombustible materials* in the construction of the buildings containing them; and, secondly, to subdivide these collections into suites of separate rooms, which may be connected by wide and high *doors of metal*, rendered ornamental by plates of bas-relief, made to open upon pivots, and poised with mechanical skill, so as to be easily moved. By these precautions, should a fire unfortunately destroy the contents of any one room, it might be prevented from extending to the adjoining apartments.

It is not here intended to enter further into the details of construction, or to refer to the use of arches upon cast-iron beams and sheets of metal, &c.: but it is desirable to explain, that an excellent surface for interior finishing may be obtained, by using (instead of lath and plaster,) a lining of brick *detached from* the exterior walls. This not only affords a security against fire, but has the additional advantage of interposing a medium of air between the inner and outer walls, which, by its slow conducting power, will prevent the interior of the building from partaking of the variations of the outer atmosphere, and, consequently, in cold weather, will avoid the precipitation of moisture on the inner walls. To conclude, the examples afforded us in the ancient buildings of our own country, and those of Rome, present to the architect's contemplation a source of study on the subject of solid vaulting, in which, however dissimilar the forms, he will discover the application of the same mathematical principles of construction, combining strength, lightness, and economy of material.

Durham, March, 1829.

[*Ib.*

ENGLISH PATENTS.

To John Robertson, *Rope Manufacturer, for improvements in the manufacture of Rope or Hempen Cordage.* Dated 4th Sept. 1828.

The improvements, for which this patent has been granted, consist principally in impregnating the spun-yarns with tannin previously to their being twisted into cordage; and the manner in which this is effected, is, by steeping them in an infusion of oak-bark, sumach, catechu, or valonia, until its action on them is completed.

Three pounds of oak bark to a gallon of water is the proportion that the patentee prefers for the infusion, or such a quantity of the other substances mentioned, as will be equivalent thereto, according to the tannin contained in them.

For Russian or Italian hemp, twenty-one days submersion in the infusion will be, in general, sufficient; and fourteen days for New Zealand hemp, for that from Manilla, or for other articles of a similar quality.

The oak bark (or any of the other substances mentioned) is to be left to infuse in water in pits, baques, or other proper receptacles, for three or four days, before the yarn is put in; which latter is then to be coiled down into it, so as to occupy as much of the receptacle as is possible, consistently with being perfectly immersed.

When the action of the infusion on the yarn is finished, it is to be taken up, well drained, and then thoroughly dried; after which it is to be twisted into the different sorts of ropes or cordage required, by the means usually employed.

The patentee asserts, that the impregnation of the rope yarn in this manner, will so much increase its durability as to make any addition of tar to it totally unnecessary.

Obs.—The importance of an invention, that will produce any material saving in the consumption of hemp, may be estimated from the consideration of the large sum annually paid to Russia alone for that article, which we are informed is no less than two millions on an average. Hence, if Mr. Robertson can prove, that tanning the rope yarn increases the durability of cordage in any considerable proportion, he will greatly serve his country, as well as himself; as the dependence on Russia for such a large quantity of a material so essential to our navy, must cramp the political councils of our government in a quarter, where, at the present crisis of foreign affairs, restraint of any kind is most injurious.

To compare the tanned cordage with that which has been tarred, goes, however, but a small way towards establishing this desirable point; since it has long been the opinion of very good judges of the subject, that tar increases little or nothing the durability of cordage, and by no means adds to its strength; the acid contained in tar tending, in their opinion, to its premature decay, and the stiffness caused by this material rendering it more liable to break, wherever it be considerably bent. We have, it is true, often seen tanned sails

used in vessels, particularly in small craft, but we know of no documents to prove the expediency of the practice; and believe it has in general been adopted from an inference drawn from the effect of tanning on hides, that has no firm foundation; since hemp contains no substance analagous to the gelatin of the hides, that is rendered insoluble by the tannin; on which chemical action the whole efficacy of the process depends.

As a farther argument of the inefficacy of tar for the preservation of cordage, we may state that experiments are now in progress in the Government Rope Yard at Woolwich, on the advantages of substituting a solution of caoutchouc for this substance; which of course would not be necessary if tar were not acknowledged to be inadequate for the purpose. These experiments we have reason to think have hitherto been attended with success; and we have little doubt of the decided superiority of the proposed substitute, the only drawback to the use of which appears to be in its expense; but we have hopes, that even in this respect no insuperable obstacle will exist to its adoption, since, in the first place, we are informed, that a very small proportion of the solution is sufficient for the purpose; secondly, caoutchouc, we believe, might be obtained in any requisite quantity from our Indian settlements, and from South America; and the plants that produce it might also, doubtlessly, be cultivated advantageously in many of the British colonial establishments; thirdly, coal-tar oil, that is asserted to be a good solvent for it, is inexhaustibly abundant; and fourthly, though we are not acquainted with the solvent employed by the gentleman, who has proposed its use to government, so as to judge of its expense, yet we are aware of a preparation of it, or rather of a pliant varnish in which it was a principal ingredient, that was found to be very efficacious; in this one pound of it gave the qualities required to no less than seventy pounds of linseed oil (now a very cheap article;) the method of preparing which varnish may be found in our 24th vol. second series, p. 157, in the specification of Mr. Clark's patent for making beds and other articles, of flexible cases filled with air; an invention now likely to obtain great public notice, from some new applications of it of great utility, that have been lately discovered.

We take this opportunity to state, that we understand great efforts are about to be made for the cultivation of the New Zealand hemp plant, the Phormium tenax, in Ireland, (where it thrives remarkably well,) and in other parts of the United Kingdom, with a view to free us from all dependence for hemp on foreign nations. The Phormium tenax so much resembles our common flags, or iris, in its leaves, that there can be little doubt, that like them it would grow well in any moist soil. Its fibres are so much stronger than those of common hemp, that it has been proved, by accurate experiments lately made in the Royal Rope Yard, at Woolwich, that cordage made of it of three-quarters of the substance of that of common hemp, will be equally strong; which alone will occasion a saving of 25 per cent. in its consumption, exclusive of the important political advantages to be derived from it before noticed. [*Repertory Pat. Inven.*

To JOHN BENJAMIN MACNEIL, *Engineer, for improvements in preparing and applying materials for the making, constructing, and rendering more durable, Roads and other Ways; which materials so prepared, are applicable to other purposes.* Dated May 6, 1828.

THE chief materials alluded to in this title, consist of clean sharp sand, and Roman cement, in the proportion of one-eighth of each, added to six-eighths of chippings of granite, or of other hard stone, broken flints, or clean gravel, mixed up with a proper quantity of water, equal to about a quarter of the whole: this mixture as soon as made is either to be put into moulds of the shape nearly of rectangular paving stones, and when firmly set in that form, to be used in the manner of such stones, in covering the road way, previously well levelled transversely; or without using moulds, is to be at once spread over the road way, so prepared, to a proper thickness, and then being scored across in small angular channels, at proper intervals (which may be equal to six or eight inches) to let the rain water drain off into the sewers at each side, is to be covered with a coat of a proper thickness of broken granite, or other hard stone, or of gravel. The other materials mentioned are flat hard stones, such as are used in pavements, or hard bricks, which are to be applied in covering the road way, in the same manner as the blocks of the composition above mentioned.

Though Roman cement is preferred in making these blocks, yet other cement formed of lime, or other fit substance, may be used. To facilitate the preparation and mixture of the foregoing composition, a square platform or level floor, may be used, made of flat stones, bricks, or boards, having edges raised up at three of its sides, on which floor the materials are to be worked up to a proper consistency.

According to the proportion of the moulds for shaping the composition into blocks, represented in the drawings, their length is to be about two and a half measures of their breadth, and their depth is to be about a quarter more than their breadth, which quarter will nearly allow for the bevelling of the angles of their upper surfaces, with which they are to be constructed, to form channels when they are laid together, through which the surface water may pass into the drains, under the upper coat of broken stone or other materials. Twenty or thirty of those moulds are exhibited in the drawing, formed in one long case, or coffer, supported on four wheels, to facilitate the conveyance of the blocks to the place, where they are to be laid out to dry, and become hard. Several moveable vertical partitions running down in grooves across the coffer, divide it into the desired number of portions for the formation of the blocks, which, when raised, easily permit the latter to be removed; and the bottom of each mould, having its angles filled up by ledges of a triangular transverse section, will shape the part of the block next it, into a proper form for its upper surface. Moulds of many other forms may

be likewise used for the same purpose, but those mentioned are preferred by the patentee,

The great object of the preceding method of constructing roads, is to prevent the wet, in the first place, from penetrating into the soft clay, or earth, beneath the road, and converting it into mud, as usually happens in common roads and ways during wet weather; and next, to hinder such soft matter, if produced in this or any other way, from rising up between the interstices of the upper coat of hard materials in the concussions they will receive from heavy carriages passing over them; and also at the same time, to make impossible the penetration of these upper materials, into any soft substances, that may happen to lie under the road from any cause whatsoever.

Besides the formation of roads, the composition mentioned may be used in the construction of sea-walls, or the embankment of canals or rivers; the sides and bottoms of docks, locks, and bridges, and in other aquatic works of various descriptions, either by previously forming it into rectangular blocks, of proper sizes, in the manner before stated, and then using them with fit cement, as building materials; or the embankments or other walls, may be made by placing coffer dams, or cases, or their front only, (according to circumstances) of the most convenient size, where the walls are required, and then pouring into them, or behind them, the materials before particularized, after being worked up with water into the state best suited for the purpose.

Obs.—There can be little doubt, that the above described method of making artificial blocks, to form a sub-stratum for roads of broken stones, would be very serviceable in districts where small stones or gravel can alone be procured naturally, or without enormous expense in carriage; and though the first cost of roads, so formed, will occasion an objection to them, and perhaps the only one that can be made, yet it requires but little information to be aware, that many places exist, (where the sub-soil of the country is either clay or some other yielding substance) in which, what would be saved by such roads in preventing the frequent repairs, necessary in the present mode of constructing them, would make them in process of time, the cheapest that could be used.

We understand, that a trial of the artificial blocks of the patentee is being made in the road adjoining to the Highgate Archway, as a sub-stratum to the other materials of the road; but we think the choice of this place for the experiment, by no means judicious, as the sub-soil there is not deficient in ordinary firmness, and is besides extremely well drained, by its considerable elevation; whereas, in order to prove the advantage of the plan, the situation for the experiment should be one, where the sub-soil was soft, and at least not above the level of the adjacent country; such as might be easily found at the Surrey side of the river, and in many other places not farther from town than that chosen.

We regret to say, that the great thoroughfares of London, (where some of the plans of the patentee might be most beneficial for the

durability of the ways,) are so intersected by the pipes of the numerous water and gas companies, and would be necessarily so frequently broken up for the repairs and alterations which they must require, that but little advantage could arise from covering the ways in any manner better than that used at present, in paving them with blocks of granite. The enclosing these pipes in subterraneous passages, or *sub-ways*, proposed by Mr. Williams, promises at least a means for the removal of this objection; but the great number of these pipes in many streets, forms an obstacle to this plan, that is superable only by such a powerful interference of government (for the removal of all pipes over the very few absolutely necessary for the supply of water and gas,) as we much fear will never be exerted.

[*Ib.*

To George Johnson Young, *Iron Founder, for a Machine, whereby an additional and improved purchase or power will be given in working Ships' Windlasses and Capstans.* Dated 21st June, 1828.

In the improved windlass, described in the specification of this patent, an axle is placed above, and parallel to the body of the windlass, of sufficient strength for the purpose to which it is applied, and supported at each end by the windlass-bits: on this axle are fixed four or more small flat vertical cylinders, at equal intervals asunder, having several square holes in their edges for the insertion of the butts of handspikes, by which the whole is turned round: there is also fixed on one end, or both the ends of this axle, a pinion, or small toothed wheel, with strong teeth; and immediately beneath these pinions, large toothed wheels are fastened to the body of the windlass, on which they are made to operate by chain-bands, the alternate links of which fall in between the teeth of the pinions and of the wheels, and cause them to turn simultaneously. In this first method the windlass body is kept from recoiling, by palls supported by a pall-bit in the usual manner; but in a variation of the windlass afterwards mentioned, an additional security against this accident is given by a sort of pall, hinged to every second intermediate link in the chain-band, (and which are somewhat curved inwards, that they may lie close to the chain-band in those parts of the revolution, where they are not required to act,) that fall in between the serrated teeth of the segment of a wheel, or ring, toothed internally; which is fastened vertically to the deck, directly under the large toothed wheel on the windlass-body, and sufficiently near to it, to receive the palls mentioned, as they come round. Another variation in this windlass consists in making the axle, that carries the pinions, in two parts, (but in the same line,) meeting in the middle in the pall-bit, but in other respects constructed as that before described.

The chain, of which the chain-bands are formed, is of a particular kind, and seems essential to the second sort of windlass, but not to

the first; it is composed of hollow cylindrical links, equal in their heights and diameters, connected by other links, like square frames, when viewed in front, but which consist each of two flat pieces joined by round bolts, that pass through the cylindrical links: every second one of these latter connecting links, has the flat pieces belonging to it made of a triangular shape, with one angle of each piece projecting from the chain; and between those projecting angles the curved palls alluded to are fastened by bolts, that pass through one of the ends of each pall, and through both the projecting angles.

This same sort of chain is used also with the improved capstan, only varying, in having neither curved palls nor triangular plates in the connecting links. The spindle turns round within the body of this capstan independently; and has a separate head, (for receiving the butts of capstan bars) attached to it above that of the capstan: the bottom of the capstan is hollow, and has a metallic ring fastened at its lower edge, formed with internal teeth all round, having semi-cylindrical interstices: on the lower part of the detached spindle a small wheel is fixed, having teeth round it, with interstices similar to those of the ring; and coming almost in contact with it, another wheel of the same form and size, and in the same position, is placed on an axle that is secured to the deck, and round those two small wheels a chain-band, of the sort of chain last described, is passed, the cylindrical links of which serve the double purpose of making the two small wheels revolve together, and of acting on the teeth of the toothed ring at the bottom of the capstan; as these cylindrical teeth project sufficiently beyond the latter small wheel, to fall into the semi-cylindrical cavities between the teeth of the ring.

By this arrangement, when the spindle is made to revolve, by capstan-bars applied to its head, the body of the capstan will turn with a power so much greater, as its diameter exceeds that of either of the small wheels; but when so great a power is not required, the capstan body may be made to turn with more velocity by applying the bars to its own head; in which case the spindle will revolve in the same direction with a slower motion within it, that will occasion a friction, which, however, is too slight to be of any consequence.

In like manner the windlass may be worked more quickly, by applying the handspikes to its body, instead of to the disks on the axle; and also in some other cases, where great power is not wanted, the axle may be made to revolve by handles, or winches, placed on its ends, which project beyond the windlass-bits sufficiently for this purpose; and on one or both of those projecting ends, small cylinders may be also fixed, which will be useful for hauling the running-rigging of the vessel, as well as for other purposes; and will thus supersede the necessity of having on the deck the second small windlass, worked by winches only, that is usually placed close to the mainmast in merchant ships.

Obs.—Chain-bands were first applied, to connect revolving tooth-wheels, by the celebrated M. Vaucauson, many years ago; but he only used them where the power employed was so small that bent

wire was sufficient for their links; we may, therefore, consider their application to turn heavy machinery for overcoming great resistances as a novelty not yet sanctioned by experience. The patentee states in his specification, that the teeth of wheels, with which chain-bands are used, are much less liable to break "in heavy lurches of vessels" at sea, than those of wheels that act immediately on each other; this we believe, because the strain is by the chain divided over several teeth of the wheels at the same time; but unless he can prove that chain-bands themselves are less liable to break than the teeth of wheels acting in the usual manner, no advantage from their use evidently can exist to compensate for their additional expense. We can, moreover, see no benefit in the teeth for wheels, that he has recommended, as we think the chains would be more liable to slip over the semi-cylindrical interstices between them, and of course have a less firm gripe on the wheels than if the teeth were made in the usual manner.

We have also to observe, that the manner of giving increased power to the capstan described by the patentee, is similar in its principles to that for which Captain Kent obtained a patent previous to 1827, the chief difference between them being in the use of chain-bands by the present patentee, in place of the interlocking toothed wheels employed by Captain Kent. [*Ib.*

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS GRANTED IN JULY, 1829.

With Remarks and Exemplifications, by the Editor.

1. For an improved machine for *Mortising, Boring, and Sawing;* Reuben Medley, Bloomfield, Nelson county, Kentucky, July 7.

The inventor of this machine has not pointed out any particular part which he claims; we are, therefore, left to the conclusion, that the whole is new. The sawing part, is, we apprehend, intended principally for cutting tenons; at all events, it is designed for articles of a moderate length only. A saw frame is moved vertically by a crank, and the article to be cut is fastened upon a carriage forced forward by a feed hand; the piece to be mortised is to be secured, and made to advance in the same way, a second crank working the frame up and down, in which the chisel is fixed. The augers, or bits for boring, are to be fixed in the end of a vertical cylindrical shaft, working both above and below, through holes in guide pieces; a screw is cut upon the shaft, and in one of the guide pieces, or collars, and, in consequence, when the shaft is turned, the auger is raised, or lowered, by the action of the screw. By means of two fixed, and two moveable, whorls, and of two bands, one of which is crossed, the shaft may be made to turn in either direction, so as to force forward, or to withdraw the auger. The whole machinery is to

be moved by drums, whorls, and bands, acted upon by hand, or other power.

The only point of novelty which we perceive in this instrument, is, in the mode of forcing the auger forward, and withdrawing it; we are very apprehensive, however, that if this part be really new, it will not be found to be very useful. Bits, or augers, rarely admit of being forced forward by screws, and where they do, they must be screws of a very fine thread, but little calculated for the rapid whirling motion intended to be given by the kind of machinery which we have described.

The absence of any claim, leaves the patent upon, what appears to us, a very insecure basis.

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2. For a new and useful *Mode of Purifying Water* by means of a machine denominated the "Patent Filterer;" George Busby White, New York, July 7.

The specification of this patent has the merit of brevity, it being in the following words.

"This improvement consists of a cistern constructed of any suitable material, and of any size or shape required; it is lined with water proof cement, or any other proper substance. The cistern is filled with small stones, having a partition, or division, across it, permitting the water to pass under it from one end of the cistern to the other. The water is introduced at the top of one end, and passing through the bed of small stones, and under the partition, then rises up to its level in the second department, until it overflows into the reservoir." GEORGE BUSBY WHITE.

There is no drawing accompanying the specification, and, consequently, one of the absolute requirements of the patent law has been disregarded. The law says, "and shall accompany the whole with drawings and written references, wherever the nature of the case admits of drawings." That the nature of the case would *admit* of a drawing in the present instance, any one may perceive; and the *model* which the patentee has himself sent on, testifies to the fact.

Some of our readers who are acquainted with the progress of inventions, may tell us that there is no novelty in the plan of Mr. White; that it has been proposed to filter the water for the supply of whole cities, by a similar, but more perfectly arranged mode of operating; and may remind us, that patents have been already obtained for filtering apparatus, in which sand, gravel, and other substances have been employed to purify the water, which has been made to percolate these materials, *per latus*, *per ascensum*, and *per decensum*. All this is true, but, of course, Mr. White was uninformed upon the subject. It is one which has been much agitated of late in England, in consequence of the disgusting and increasing filth of the water of the Thames, from which the city of London derives a large portion of its supply for domestic use, and we have, in the present number, inserted an account of a very simple and ingenious plan which has been carried into actual operation in England,

by a namesake of the present patentee; it will also be seen that the same gentleman has employed a bed of sand and gravel for filtering in the large way. Were we to publish all that we possess in the foreign journals, and other works, relative to this process, we should fill a volume with the matter, and render it manifest that something more recondite than the plan before us must be brought forward before a claim to novelty can be sustained.

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3. For an *Improvement in the Hoe;* Gideon Freeborn, New York, July 7.

The following thirty words comprise the whole of the specification.

"The improvement consists solely in the use of malleable cast-iron, as a material for the formation of the eye, to be fastened with rivets, or to be welded on."

We admire brevity, but it should be coupled with clearness, and this certainly is not the case with the foregoing description. What is the "malleable cast-iron" intended? Is it cast-iron rendered malleable by annealing? Will iron of this description weld? We apprehend that the annealed cast-iron is the kind meant, but are not aware that this can be welded.

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4. For a *Horizontal Rack and Pinion Cotton Press;* Zenos Bronson, Jesper county, Georgia, July 7.

Horizontal presses for packing cotton, are well known in the south. The improvement proposed by the present patentee, is, the forcing the follower of the press onward, by means of a rack and pinion. In the drawing, there are two large cog wheels, and three pinions, used, by which any desired power may be obtained.

The claim is to "the application of the rack and pinion, in the way described, for the purpose of packing cotton into boxes, or bales."

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5. For an improved mode of making and applying *Splints to Fractured Limbs;* David S. C. H. Smith, Physician, Sutton, Worcester county, Massachusetts, July 7.

These splints are to be made of hatter's felt, which is to be saturated with shel-lac varnish. Moulds formed of plaster of Paris, or of carved wood, may be employed to give the varnished felt the proper shape. The felt is to be cut of such a size as to form a splint which will embrace rather more than one-half of the limb. When the varnish is dry, these splints are sufficiently stiff to retain the form given to them. To adapt them to a fractured limb, they are to be held over the steam of boiling water, which will render them sufficiently pliable to admit of their being moulded by the hand, and of acquiring their final form from the limb itself. Counter splints are placed on the opposite side of the limb; these counter splints have buckles attached to them, which receive straps from the splints, to secure them in their places.

The patentee says, that "among the prominent advantages to be

derived from the use of my felt splints, as above described, are, that the splints, when properly applied to the fractured limb, prevent its shortening, and all motion between the divided ends of the bones. And as the splints can be exactly fitted to limbs of every kind and description, a bandage may be firmly applied without causing pain, excoriations, swelling, or other bad consequences arising from the unequal pressure of the splints."

"In fractures of the lower extremities, as of the leg below the knee, as, for instance, when both bones are broken, the patient can rise from his bed without the assistance of any one, and move about upon crutches during the whole process of cure, not being under the necessity of being confined to the bed after the first shock of the injury has passed, and the consequent inflammation subsided, which usually takes place in five or six days; and in common cases, no confinement is required."

"What I claim, is, the *felt*, and the application of it to fractured limbs."

This claim is rather awkwardly expressed, as we apprehend that the Doctor does not mean to claim the *felt*, but his mode of forming it into a splint.

The moulding of splints to the limb is not new, and of this the patentee appears to be aware. Fractured limbs have been enclosed, in whole, or in part, in plaster of Paris, and other devices have been adopted for attaining the same end; but, perhaps, the present may be a real improvement upon all previous modes; we hope it may prove to be so, but in this case we shall regret that the Doctor had not followed the example of the numerous individuals among the members of a liberal profession, who have improved the art of surgery, and devoted their improvements freely, to the aid of their brethren, and the relief of suffering humanity. Not that we think it improper, or incorrect, in a surgeon, to secure to himself, in certain cases, a fair remuneration for his discoveries. Trusses, or other instruments applicable to the cure of chronic diseases, appear to us fair subjects for patents; but the physician and the surgeon would be unpleasantly situated, were he compelled to purchase a right to the use, or forego the employment, of every discovery and improvement made within the last fourteen years.

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6. For a method of *Cleaning or Hulling Rice*, coffee, clover seed, and other grains or berries requiring to be hulled; Zenos Bronson, Jesper county, Georgia, July 7.

A number of hollow cylinders are made to revolve horizontally upon gudgeons, and parallel to each other. They may be made of wood or metal; and each of them is to be furnished with a door near to one end, to admit the grain, or other article to be hulled. Iron balls, rounded pebbles, or other hard substances, are put into these cylinders, the friction of which against the grain, is to produce the intended effect.

The cylinders are to be placed in a frame near the ceiling of a

room; there are to be holes in the floor above, and supply spouts, corresponding with the openings in the cylinders. The frame is hinged so that the ends of the cylinders having the doors in them, may all be lowered, to deliver the grain, &c., the balls, or stones, being prevented from falling out by means of a grating.

A band is passed alternately above and below the cylinders, to cause them to revolve.

"What I claim as new, is, the mode of cleaning or hulling by means of revolving cylinders, in which the operation is performed by hard substances placed within them, as above described."

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7. For an improvement in *Working Pumps*, called the "Geared Pump;" Manuel Francis, Boston, Mass., July 7.

The patentee begins by telling us, "my invention consists in the application of a windlass, and a train of multiplying wheels and pinions, so constructed as to work a pump by the power of a weight applied to the windlass, or barrel."

Need we tell any thing more about the invention? certainly not to one who has passed the *pons assinorum* in mechanics.,

There are three wheels, working in three pinions, each increasing the motion about threefold. The last pinion carries the pitman, or shackle-bar, which is to work the pump. A ratchet wheel and click is attached to the barrel upon which the rope sustaining the weight is to be wound. "A balance wheel proportioned to the moving power, is attached to the arbor of the crank."

The hope to obtain an increase of the effective power of a machine, whilst the motive power remains unchanged, results from a total ignorance of what is meant by the quantity of motion, and this ignorance is the parent of most of the absurd propositions which are made in mechanics. In the example before us, besides this error, there would be a loss of about one-third of the power applied from the friction of wheels and gudgeons, and the rigidity of cords.

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8. For a *Double Acting Pump*, with one cylinder and piston; Russel Wileman, East Hartford, Hartford county, Connecticut, July 9.

Double acting pumps with single pistons are by no means new; they were not so when used at the old water works in Philadelphia, nearly thirty years ago; they are now employed in an improved form at the new works, and have been variously modified, according to the purpose for which they were required, or the fancy of the maker.

To those who understand the construction of Boulton and Watt's double acting engine, it is only necessary to say, that the pump for which Mr. Wileman has taken a patent, resembles it very closely. Imagine the induction, to be the supply pipe, and the eduction, the delivering, or discharging pipe, and you have the whole apparatus.

In the plate which forms the bottom of the cylinder, there are cavities to connect it with the supply and discharge pipes; these are claimed by the patentee, and are, in fact, the only things abso-

lutely claimed, the remainder being *conditional*, and in the subjoined words, "the other parts described in this specification I claim only so far as they shall be found original with myself."

The patentee thus leaves it to others to discover what is new in the construction of his machine, a task which, we apprehend, the law will not impose upon them, and, if it did, it is one which we fear they might find it difficult to perform.

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9. For a machine for *Dressing Hemp and Flax;* Horace L. Barnum, and Matthew Stevenson, M. D. The former of Washington city, D. C., the latter of Cambridge, Washington county, New York, July 8.

This, like most of the breaking machines for hemp and flax, is to operate by fluted rollers, mashing into each other. A large iron cog wheel is made to revolve by any suitable means. The teeth of this wheel drive pinions upon the ends of rollers which are placed around it, so as to embrace about three-fourths of its circumference. In the drawing which accompanies the specification, twelve rollers are represented, one side being left free to supply and deliver the hemp.

The rollers above described stand at a small distance from each other, and are surrounded with another set of fluted rollers. The gudgeons of these exterior rollers are placed so as to stand exactly opposite to the spaces between the interior rollers, so that the flutes of one exterior may mash into those of two interior rollers. This, where there are twelve of the latter, will, of course, require eleven of the former.

There is a feeding apron to supply the hemp to be broken, which is placed opposite to the upper pair of rollers, and a receiving cloth, upon which it is delivered from the lower pair. In passing between the two rows of rollers, the hemp or flax receives an undulating motion, being acted upon twice by each of the rollers, in consequence of each mashing into two others. This, it is said, gives a decided advantage to the machine.

The gudgeons of the exterior rollers work in slots, so that they may be borne up against the interior, by means of springs, weights, or pulleys, or by a weighted lever, the latter being preferred, as it is readily graduated to any desired pressure.

The patentees claim, "the application of the moving power, applied to fluted, or other rollers, for the purpose exemplified, or for any other purpose to which it may be applicable."

"The disposition of the fluted, or other rollers, without limiting their dimensions, or without confining themselves to any number of rollers, or any particular mode of gearing them."

"The *mode* of applying the lever, or pulley, to give the pressure."

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10. For a machine for *Separating Gold Dust, Grains and Particles from the Ore,* and other minerals lighter than gold; Richard Lee, Rutherford county, North Carolina, July 8.

The new and inviting business which now claims the attention of a large number of the citizens of North Carolina, the search after gold, is likely to give birth to many contrivances for conducting the washing and other operations of the mines. The business, as it is new, is of necessity conducted in a rude manner, and in some situations where considerable quantities of gold are found, we are convinced that not more than 50 per cent. of that contained in the ground is separated; we speak from actual knowledge, and credible information.

Although in a business so long pursued in other countries, the ingenuity and skill of those concerned have produced many admirable devices for attaining the end proposed, it is difficult to become acquainted with them, as they are, in general, very imperfectly described in books, and the best works upon the subject are in foreign languages, particularly in the German, as it is principally in Germany and in South America, that this business has claimed attention.

The principle of operation in the machinery now patented, has not in it any thing of novelty, and we think it inferior in its details to some which have been described. The ore to be washed is to be placed in a long trough, a little inclined. The lower end of the trough stands over a hopper, or funnel, in which there is a skreen, or sieve, to detain the coarser pieces of stone, or ore. The matter which washes over passes down into a trunk, or trough, the end of which inclines upwards, that the water, and lighter particles of earth may flow out, and leave the heavier portion behind. The larger particles of gold may afterwards be picked out, and the finer separated by amalgamation.

The claim is to "the trunk, or body of the machine, with its spout and funnel."

Were we to undertake to conduct operations in the gold district, we should industriously seek information respecting plans long followed and approved; an inquiry more likely to produce useful results than any thing which will, probably, be discovered, whilst what has been previously effected remains unknown.

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11. For a *Machine for Dressing Hair*, called a Hatchelling Machine; William Chubb, New York, July 9.

A cylinder about 3 feet in diameter, and 18 inches in length, with its axis standing horizontally, is made to revolve upon a suitable frame. Strips of iron formed into teeth, stand along the cylinder at regular distances from each other. In front of the cylinder there is a feeding cloth upon rollers, like that of a carding machine. Just above the feeding cloth, and upon the same plane with it, there is a sliding frame, with a contrivance for confining the hair to be dressed, or hatchelled. This frame is carried forward by a rack and pinion, moved by cross levers, or arms. The cylinder and feeding cloth are to be put in motion by any suitable power; the frame confining the hair is to be moved by hand.

The claim is to the general principle and construction of the machine, and to its application for dressing hair, hemp, &c. &c.

What is the kind of hair to be dressed, or hatchelled, we are not told, or for what purpose it is so prepared, nor are we possessed of the information requisite to form any certain judgment upon the subject; we cannot, therefore, offer any opinion upon the merits of the machine.

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12. For an improvement in the method of *Heating Rooms and Houses*, by means of a furnace called the "Cylindric Air Heater;" Charles Fowler, Hartford, Connecticut, July 10.

This Cylindric Air Heater consists of three concentric cylinders placed vertically, one within the other, with spaces between them for the passage of air. The inner cylinder is the stove to contain the fuel, the second or middle cylinder is to be made of tin plates, and the outer of sheet iron. A large tube passes from the outer to the inner cylinder, through which the fire is to be fed. This opening is at about the middle of the cylinder, and is closed by a door. A pipe to convey off the smoke, runs directly up from the stove, through openings in the tops of the two outer cylinders. Air is freely admitted below, which is to pass up, become heated, and be conveyed by pipes wherever it is wanted. These air pipes pass from the spaces between each of the cylinders, and form a connexion with each other.

For a stove so constructed, the patentee claims a decided superiority over all that have preceded it. He states that it is cheaper, requires less fuel, can be easily removed; "and also in this, that the interior [middle] cylinder being constructed of bright tin, is by no means a good conducter of heat, so that comparatively very little heat is absorbed by, or escapes from, it, and, consequently, the air between it and the stove becomes more readily heated, and, therefore, a greater quantity of it must pass off through the flues; and also in this, that it has two cylinders, the exterior of which being of sheet iron, retains all, or nearly all, the heat that escapes from the interior," &c.

Now it unfortunately happens that all this is very bad philosophy, which, however, would be of little importance in the present instance, if it had not led to a gross error in practice. It is assumed that tin is a bad conductor, and that the black sheet iron will retain nearly all the heat; whilst the fact is, the tin is considerably the best conductor of the two, whilst the sheet iron will part with its heat by radiation, at least six times as rapidly as the tin. The latter, to have answered the design of the inventor, should have formed the outer cylinder, whilst the inner might have been made either of sheet iron, or of tin.

We cannot here discuss the subject of the two modes by which heat is distributed, namely, conducting power and radiation; a knowledge of them, however, is very important in its practical applications, and ought to be acquired by those who undertake to econo-

mize heat. The subject is by no means intricate, and is explained in every elementary book upon chemistry.

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13. For *Casting of Iron Ploughs in one Entire Piece;* John Boynton, South Coventry, July 10.

"This plough differs from all others, in that it consists wholly of iron, and is cast in one entire piece, excepting the share and handles, and these may be cast together with the body of the plough if required; but the handles to be of wood, and the share to be separate, so as to be taken off for sharpening, or altering, is thought best.

"The beam is cast something wider and thinner than common wooden beams, and to strengthen it, there is at top and bottom, on both sides, a rib, or moulding, and in the centre of the off side, one projecting considerably further than the others. In the end of the beam are three holes, in which to hook the chain, and by shifting from one to another, the plough is regulated to go more or less deep. To support the mould board, is a brace, or bar, uniting at one end with the mould board, and at the other with the near or land side of the plough. The handles are fastened on by screws and nuts, and are connected together by a brace, or ring, in the usual way.

"The shape of the beam; the number of holes in it; the shape of the mould board, and the size of the plough, may be varied if required; the intention of the inventor being principally to secure the right of casting the whole, or body of the plough, in one entire piece."

The foregoing is the whole of the specification; the object of the patentee, therefore, is merely to secure to himself the right to cast the bodies of ploughs in one entire piece. We have taken occasion in several instances to express our doubts of the validity of such a claim, and we are also unable to perceive the utility of the proposed *improvement*, as we apprehend that the extra difficulty in moulding will be fully equal to the cost of a few short bolts and nuts.

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14. For a *Current and Tide Wheel*, for driving mills for grinding, and other purposes; Asa Madison, Detroit, Wayne county, Michigan Territory, July 10.

This we believe to be a new plan for a tide, or current wheel; at all events, it differs from all those with which we have been hitherto acquainted. There are numerous plans for hinging or hanging the floats or buckets, so that upon one side of the wheel they shall expose their edges, and on the other their flat surfaces to the action of the water. In the plan before us, the buckets are to slide in grooves, so that they may all be actually upon one side of the wheel.

The wheel has no axle, or shaft, passing through it, but has round ends upon which gudgeons are fixed; the ends being connected together by iron rods passing from one to the other, between the floats, and near the rims. On the inside of each end of the wheel, pieces are fixed which form grooves in which the floats are to slide from one side of the wheel to the other. A stationary semicylindrical

curb, or case, is to surround that half of the wheel which is not to be acted upon, in order to throw the current on the opposite side.

The means by which the floats are to be made to pass from side to side, are not specified, as it is said that this may be effected in various ways; it is observed, however, that "the floats on an inclined wheel may be changed by making them buoyant." To cause them to slide with ease in the grooves, or upon the ledges by which they are kept in their places, it is proposed to furnish them with friction wheels.

The claim is to the construction of a wheel in which the buckets shall change from side to side, without regard to the number of buckets, the inclination of the wheel, or other circumstances.

Such a wheel is pretty enough in theory, and if the floats could be made to pass from side to side with the same facility with which their action can be described, they would be excellent in practice. We are extremely apprehensive that the fond hopes of the patentee will never be realized, as we believe that this shifting motion cannot, in any way, be advantageously effected; we also think that weeds, boughs, and other articles carried along by the current, would materially interfere with the regularity of the sliding action, did not any stronger objections present themselves.

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15. For a Parallel moving *Perpendicular Tooth Extractor;* Elijah Bryan, New York, July 13.

The construction of this instrument may be conceived by supposing it to be formed by uniting one pair of the forceps used for extracting teeth, and which always make a part of the sets of instruments for that purpose, to a part of another pair, in the following manner. Grip the jaws of one pair between those of another pair, their handles standing at right angles to each other; then suppose the handles of the first pair to be cut off just above the rivet, and the jaws of the second pair to be united to the outside of the others, by means of a joint which will operate both as a hinge and swivel; by opening or closing the handles of the forceps, the claws which are to embrace the tooth will also open and close. A part of the shank of the forceps, or of a projecting piece attached to it, is to rest upon a tooth, or teeth adjoining that to be drawn, so as to form a fulcrum upon which to bear the instrument in extracting a tooth. This bearing or fulcrum is to be covered with India rubber, leather, or some other elastic substance.

The claim is to the making of the claw, to move on pivots or swivels in the act of extracting a tooth, and its application to that purpose, however the same may be modified.

Numerous perpendicular extractors have been made and patented, and there are but few dentists who have not essayed, and rejected them, in consequence of the many objections to them in practice. It is not often that the adjoining teeth will bear the pressure necessary to extract one which is firmly seated; many teeth may be more readily drawn in a curved, than in a vertical direction, and a skilful

operator, with a firm hand, and a strong wrist, will, in four cases out of five, be perfectly satisfied with the common instrument, or with the forceps. If a man is deficient in mechanical skill, in strength of hand, or in a knowledge of the structure of the teeth, he will, of course, make bad work in what is at the best a very rough operation; but with these prerequisites, the existing difficulties are but few. It is freely admitted that the ordinary instrument is defective, and that an improvement upon it is much to be desired, but the arrangement now proposed does not appear to us to be more likely to produce the desired end, than several previous attempts.

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16. For a machine for *Washing and Churning;* Joel B. Pratt, Milo, Yates County, New York, July 14.

A box, or trough, with a semi-circular bottom, formed of slats, or ribs, running in the direction of its circumference, and a shaft made to turn, or vibrate, by a crank, with teeth, or pins, projecting from said shaft, and mashing in between the slats, constitute the main part of this machine. In this trough the clothes or the cream are to be *raked*, until the one is cleaned, and the other transmuted into butter. The patentee says, "what I claim is the rake, with its motion, as before specified."

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17. For a *Strap Cutting and Punching Machine;* Charles Angel, Philadelphia County, Pennsylvania, July 15.

We are unable to give a satisfactory description of this machine, as it does not appear that there is any drawing of it in the patent office, although it is absolutely necessary to its validity that one should accompany, and make part of the specification. The description is evidently written with much care, and, to himself, the explanations given by the writer, were undoubtedly very clear; but in all instances it requires a peculiar aptitude, and, in many cases, it is impracticable, perfectly to describe a machine, in words, without drawings; and hence the wisdom of that provision of the law which makes the demand for them, absolute.

The cutting machine appears to consist of a piece of wood sliding in grooves, with a cutting knife extending downwards, and sloping back at such an angle as to render the cutting easy; several thicknesses of leather are to be cut at once, there being proper means provided to regulate the width of the straps.

The punching machine consists of a block, sliding up and down between two guide pieces, there being several hollow punches projecting from the lower side of the block, and fixed at proper distances from each other. The block with the punches, is to be forced down by a lever, and afterwards the straps drawn forward, and another row of holes punched.

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18. For an improvement in the art of *Fulling and Felting*

Cloth; John D. Lounsbury, John Arnold, John A. M'Lean, and George G. Bishop, Norwalk, Fairfield County, Connecticut, July 15.

The patentees use their machinery either for fulling, or felting, but consider it as peculiarly applicable to cloth made without spinning or weaving, with the wool delivered from the carding machine.

A large drum, or cylinder, the periphery of which is formed of slats, is to receive the cloth. This cylinder turns upon gudgeons, the lower side of it dipping into a trough lined with lead, and containing an acidulated liquid, within which the cylinder is to be made to vibrate backwards and forwards. A furnace, or heater, is attached to the trough, to give to the liquor the degree of heat which may be desired. This constitutes the first operation.

A second machine, consisting of several pair of wooden rollers, standing over a trough, is next used. The rollers must be of sufficient length to allow cloth of the width to be felted, to pass between them, which it is to do repeatedly. They may be plain or fluted, and are to be pressed together by weights and levers, "this operation hardens the texture, evens the fibres, and smooths the surface of the web."

The first machine is not claimed as a new invention, it having been used on a smaller scale for washing; but its application in its enlarged form, for the fulling of cloth, is claimed. The attaching a heater to the trough, and the alternate motion given to the cylinder, are also claimed.

The principle of the rollers in the second machine is not claimed, they having been used for other purposes; but the present application, and the connecting a trough with them, are considered as new, and claimed accordingly.

It is an error to suppose that machines similar to the one first described, have not been made of a very large size. Dash wheels for washing or rinsing cloths, &c. are well known in bleach grounds, and other establishments where cloth requires this operation; they are similar in form to that now spoken of, and of very large dimensions.

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19. For a machine for *Forming the Web for Cloth* of wool, hair, or other suitable substance, without spinning or weaving; John Arnold, Norwalk, Connecticut, July 15.

Two carding machines are to be placed at right angles to each other, in such a way, that whilst the batt from one is received upon an endless cloth, that from the other may be made to cross it at right angles, the latter being cut off by machines for that purpose, at the edges of the former. Instead of cutting, it is proposed, sometimes, to leave a part of the doffing cylinder without cards, so that the batt shall be delivered in proper lengths for crossing. The parts of the machine generally, although differing in their arrangement, are similar in their operation to those for the same purpose which we have recently described.

20. For an improvement in the construction and *Application of Wheels to Carriages* of pleasure, or of burden; George Bridgman, New Haven, Connecticut, July 16th.

The object proposed by Mr. Bridgman, is, to construct wheels which shall have the effect of "rendering the moving of any heavy body much easier than in the common method, and being capable of surmounting any obstacle which may intervene to prevent the movement, or progress of a carriage, with less physical, or mechanical power, than in any other method heretofore known or used."

In the method proposed, eight wheels are to be used where four formerly answered the purpose. Four of the wheels are to be large in diameter, and the other four so small as to be capable of being placed between the hub and rim of one of the large wheels. Suppose the four small wheels to revolve upon the carriage axles; the four large ones must then be placed on axles above these, so that the outsides of the rims of the small may stand on the insides of the rims of the large wheels; these rims being made wide, and projecting inwards for that purpose. The large wheels are to be very loose upon their axles, in order to allow them to have very considerable play, that they may not bind with the small wheels. "The action of these wheels, thus applied," we are told, "will be that of one wheel," but we are still incredulous on this point. Some two or three years ago, a similar plan was proposed, and we believe patented, in England; it was described in the journals as a carriage to carry its own railway; the only difference in the two, is, that in the English plan nothing was said of the means of supporting the large wheel by a second axle, or of any other mode of keeping it in its place; probably, because the inventor perceived that this was a point of some difficulty, and he concluded, therefore, that it was best to allow the large wheel to take care of itself.

Without agitating the question of the theoretical utility of the thing upon a level road, let us suppose the large wheel to encounter an obstacle six inches in height; in this case the play upon the axis of the large wheel would be of but little avail, and if there would be no interlocking and interfering of the little and the big wheels, as they are compelled to *climb the hill together*, why then we are out in our judgment, which, like the invention itself, would be nothing new, as the one has frequently happened here, and the other has been proposed, and perhaps even tried, in England. To any one who is particularly desirous of 'making a noise in the world,' we apprehend that the patent double wheels, with plenty of play, would be very agreeable.

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21. For the application of *Steam to produce a Rotary Motion;* Joseph Mount, Nashville, Tennessee, July 16.

It would be in vain to attempt an explanation of the very complex machine above named. The arrangement of the parts has been a business of much thought, and the constructing of the machine would be one of much expense. The patentee claims "The whole arrange-

ment of the various parts, and bringing all the parts which require to be packed, into convenient situations to be packed, or tightened, without removing any parts of the engine, thereby removing the *greatest* difficulty which has attended the working of all former rotary engines."

We have repeatedly noticed the objections to rotary engines, and certainly one of them is the difficulty of packing, but still we do not think this the *greatest* difficulty. In most of the plans which have been proposed, a greater difficulty than packing, is, the obtaining in large machines the accuracy in form which they require, and the impossibility, in many parts, of making the packing a remedy for this defect, without producing an enormous portion of friction; these difficulties, we apprehend, are not removed. The *greatest*, however, has been, that, hitherto, with the same quantity of fuel, less power has been obtained from the rotary, than from the reciprocating engine, whilst, at the same time, it is more expensive.

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22. For a *Cooking Stove*, in which mineral coal, charcoal, or wood, may be employed; Ezekiel E. Bennet, Sandy Hill, Washington County, New York, July 17.

We are unable to tell in what particulars this stove differs from many others, excepting in its shape, and in some unimportant variations in the arrangement of its parts; the principal of these variations appear to be, the using of two grates, and the making the side and back plates to flare out, which increases the dimension of the upper parts of the stove. These are both claimed, together with various other particulars, as follows: "Having the insides and ends of the stoves in a position diverging from each other, from the bottom, upwards. In having narrow plates round the inside, on which the lower grate is to rest. In the use and location of the two grates. In having the front plate moveable. In having the upper plate moveable on hinges, so as to open or close that apartment of the stove. In the use and application of the tin oven. And in whatever else, either in form or principle of the thing itself, or of its application, use, or combination, the improvements described may be considered original."

The kind of sweeping claim with which the above concludes, is common in patents for those improvements which are scarcely visible or tangible; such claims, however, must be considered as useless, if not injurious: if they are mere surplusage, it would be better to leave them out; if they indicate any thing, it is that there is something intended to be claimed which is not set forth in the way that the law requires.

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23. For an improvement in the *Spring Seats for Wagons or Carriages;* Schuyler Reynolds, Northumberland, Saratoga County, New York, July 17.

The spring seat, which is the subject of this patent, is composed of slats of elastic wood, placed above each other in the following

manner. A quadrangular frame is made by taking two strips, say of two feet in length, to form the ends of the first frame, and two others of the length of the intended seat, which will be governed by the width of the wagon, or other vehicle. These are joined together at, or near, their corners, by placing the long above the short strips, and securing them by screws or rivets. A second similar frame is then made, but so much smaller than the former as to pass within it. Two strips, similar to the end pieces of the first frame, are to be placed parallel to them, and to each other, on the upper side of the front and back strips, but so near the middle of the frame as to be only four or five inches apart; these serve for the supports of the second frame. A third, fourth, or any other number of frames similarly formed and supported, constitute the spring part, upon which the ordinary seat is to be placed; the elastic frames being varied in length and width, so that they may pass within each other, without touching, in springing down. The frames and cross strips must be properly secured together, by any suitable means, such as rivets and burs, or screws and nuts. The claim is to the manner of arranging the strips.

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24. For a mode of *Refining all kinds of Oil,* and animal fat; Charles E. Ruggles, New York, July 20.

This being a process which may be performed in secret, and the right of the patentee thereby evaded, we do not publish it.

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25. For a mode of *Affixing and Applying Glass Chimneys,* similar to those used with the various kinds of Argand Lamps, *to the cork tops used with glass lamps;* Deming Jarves, Boston, Massachusetts, July 20.

The tops of the glass lamps in ordinary domestic use, consist of cork enclosed between two pieces of metal. To affix glass chimneys to these, three narrow strips of metal are to be soldered at equal distances apart, and radiating out from the upper plate; the ends of these pieces are to be bent up, and made to hook inwards, to receive and support the glass chimney. The lower edge of the glass has a rim, projecting outwards, by which it is to be held by the metallic hooks. In order to admit of fixing it in its place, a notch is left in the glass rim, which may then be placed under two of the hooks, with its notch over the third, when it is pressed down, and a small turn secures it.

This simple contrivance is certainly superior to the screw which is now frequently used to fasten the burners in their places, and which requiring to be screwed and unscrewed, is very liable to be out of order, and not unfrequently occasions the breaking of the glass.

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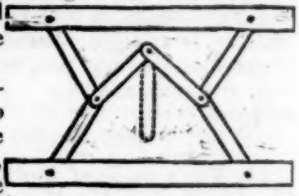
26. For a machine called the '*Power Press,*' *for Punching Copper, or other Metallic Plates,* for ships' use; George Darracott, Boston, Massachusetts, July 21.

This press is intended to punch, at once, all the holes required in a sheet of copper, or other metal. A strong frame of wood is secured together by bolts and screws; the upper timber of this frame, is about five feet long, fourteen inches wide, and six inches thick, the ends and bottom being of corresponding strength. Under this is a moveable piece, or follower, which is capable of being raised, by means of the progressive levers, or toggle joints, which are placed below it. This follower is, in the specification, denominated the plattin; it is about four feet seven inches long, thirteen inches wide, and six inches thick. These two timbers stand at about four inches apart. This space is occupied by two pieces of plank, each about two inches thick, and of the same length and width with the plattin; in the upper one are fixed as many punches as there are to be holes in the sheet, and in the lower one corresponding dies; a sheet of iron being placed between each plank, and its corresponding timber, to support the punches and dies.



The power is obtained by an arrangement of progressive levers similar to that shown in the margin; the middle joint being forced down by a lever, causes the plattin to rise, and the plate upon it to be perforated.

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27. For an improvement in the *Manufacturing of Wool;* John Goulding, Dedham, Massachusetts, July 21.

Mr. Goulding has obtained some eight or ten patents for improvements in carding and spinning, most, if not the whole of which are so intimately connected together, that a view of the entire system would be necessary to the understanding of the separate parts. The present patent is for the manner in which he crosses the wool while delivering from the card, before it passes into the tubes described in some of his former patents.

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28. For a *Machine for Printing*, styled the 'Typographer;' Wm. A. Burt, Washington, Macomb County, Michigan Territory, July 23.

We intend, hereafter, to publish either the specification, or a description of this invention, with engravings.

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29. For a machine for *Manufacturing Wrought Nails and Screws;* Stephen I. Gold, Cornwall, Litchfield County, Connecticut, July 25.

The description of this machine is of considerable length, and not easily abridged, as it attempts to describe a machine consisting of many parts, in words alone, without reference to the drawing; nor is the latter sufficiently well executed to give a distinct view of the machine. Much pains has evidently been taken with the specification, the re-

sult of which evinces the necessity of referring, throughout, to descriptive drawings, for the purpose of clearly explaining complex machines.

There is no particular part of this machine claimed, the general arrangement being considered as new.

To a strong frame, is fixed an anvil, with its face downwards; in this face, grooves, or cavities, are formed, which are the counter parts of one-half of the nail, or screw, to be made. Under this a roller is made to pass, which has grooves to correspond with those on the face of the anvil. The thread of the screw is to be formed by this kind of operation, but, as the juncture of the moulds, or dies, would leave a ridge, the roller passes twice over it, the wire being turned one-quarter round between the two motions. The screws may be headed by methods heretofore used. The chisels which are to cut off the wires, or nail rods, are acted upon by levers, cranks, and hammers; the rods are kept in a fire, in numbers, without a blast, and two are to be passed in at one time.

When a model is received, we may be able to form a better judgment of the whole, than can be done from the materials now before us; should it appear to merit a particular description with drawings, they shall be furnished.

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30. For a compound for cleaning, biting, *Sharpening, and Polishing, old and worn out Files;* A. P. & E. Brittingham, New York, July 27.

The operation of sharpening old files, as the title indicates, is to be performed by biting, or acting on their surfaces, by acids. The specimens shown at the patent office, speak well for the process, as some files were exhibited, the teeth of which were sharp, although it was declared they had, previously to the operation, been completely dull. The patent is taken for the kinds, mixture, and proportion, of the acids employed.

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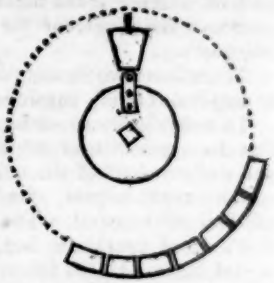
31. For a *Thrashing Machine;* Calvin Emmons, New York, July 27.

Between this thrashing machine and many others which have been made, there is a perfect resemblance, with the exception of the manner of fixing the beaters by hinging, which we believe to be new; and this is the only part claimed by the patentee. The grain is to be laid upon a feeding apron, in the ordinary mode, and is carried forward to the beaters; of these there are to be from four to eight, furnished with rows of teeth; their length is governed by the width of the frame of the machine; their outer, or thicker edges, measure from $1\frac{1}{2}$ to 2 inches, their inner edges, by which they are hinged to circular heads on the ends of the shaft, may be about half an inch in thickness; they may be hinged either with metal, or leather, the teeth from half an inch to an inch and a half in length. The circular box in which the beaters revolve, may have short teeth, or otherwise, as may be preferred.

The cut in the margin represents a section of the beater cylinder, with one of the beaters. The upper part, represented by a dotted line, is a circular case, or cover; the lower part, where the grain and straw pass, after being beaten, is formed of slats. The claim is to "the construction and application of the revolving toothed beaters, attached to the circular heads, of wood, or iron, by means of joints, or hinges, which prevent the machine from clogging, acting, or revolving, within the concave frame, and applied to thrashing all kinds of small grain."



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32. For an improved *Atmospheric Steam Engine;* James Mead and Milden Kitchell, Lebanon, Warren county, Ohio, July 27.

This steam engine, although denominated *Atmospheric* by the inventors, has but little title to the name, as it is proposed to work a double lifting, or forcing pump, by means of a double stroke steam cylinder. The whole contrivance is one of those frequent, but unfortunate, efforts made by persons of more ingenuity than skill or information. Instead of the condensor used in the Boulton and Watt engine, the pumps by which the water is to be raised, are to perform that office; for this purpose one eduction pipe leads from the upper escape valve into the body of one pump, and another from the lower valve into a second pump. It is calculated that the steam will be condensed, and a vacuum left, which will cause the atmosphere to keep it full of water to the height of thirty-three feet, when two pistons, worked by the beam of the steam engine, are to raise it higher.

The water, after being pumped up, is to fall upon a wheel, to drive machinery; after which, it returns to its original reservoir, to be again raised and to resume its labour. The mere fact of the purpose in view being to raise water by steam, to turn a wheel, renders comment unnecessary to those who have any claims to practical science, and we cannot spare time and room, at present, to write a *hornbook* for others.

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33. For an improvement in the construction of the *Ever Pointed Pencil Case;* William Johnson, Philadelphia, Pennsylvania, July 27.

The whole specification is as follows:—

"Specification of the slide for which the patent is craved.

"The slide is inserted in the pencil case; it is a circular wire, which, pressing against the sides of the case, acts as a spring to keep it in its proper place; this slide is pushed forward by a small pin connected with it, and projecting through the side of the case; the

wire entering the point of the pencil case, when pushed forward, propels the lead, and operates with the same effect as the screw now in use." WILLIAM JACKSON.

We have here just the old fashioned pencil case, the slide being used to push forward the lead alone, instead of the lead enclosed in wood. For ourselves, we so well like the gentle and regulated manner in which the screw causes the point to advance, as to be of opinion that it would be no improvement upon the beautiful case presented to us by Messrs. Woodward & Co. of New York, to substitute for it the old method of a slide, pushed forward by the hand.

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34. For a *Toothed Cylinder Pump;* E. Lazelle and D. Bloodgood, Poughkeepsie, Dutchess county, New York, July 27.

This pump consists of two metallic cylinders working within a metal box. The cylinders are to be toothed along their whole surface, are to match into, and turn, each other, like toothed wheels. They must fit exactly into the box in which they are contained, as the teeth must work water-tight, against its semicircular ends. The box is to be closed by two heads which fit exactly on the ends of the cylinders, and receive their gudgeons; one of which passes through the head for the purpose of having the crank attached to it, to work the pump. A pipe descends into the well, or reservoir, from the lower part of the box; and another pipe ascends from its upper side, through which the water is to be forced.

A pump very similar to this was patented in England, about three years since, by a Mr. Joseph Eve. The cylinders were worked by cog wheels upon their gudgeons, outside of the box; each of these cylinders had but two teeth, or wings, which were, consequently, more easily made to fit the box, and left a larger water way; that of the present patentee being only the space between the teeth of the cylinders. We should be glad to be able to give the preference to the pump of Messrs. Lazelle and Bloodgood, but, whilst the principle is evidently the same, the difficulty of making the latter, the difference of the water way, and the amount of friction, are all against it. We have not seen either at work, but the account given of Eve's pump was a very favourable one; it is stated that with "Cylinders $3\frac{1}{2}$ inches diameter, by 6 inches long, and the wings only $\frac{3}{4}$ of an inch wide, two men turning the winches, raised 1100 lbs. of water to the height of 21 feet, in three minutes;" which considerably exceeds the power of the ordinary pump.

If a pump can be so constructed that a continued stream shall be made to flow up the shaft, instead of allowing the water to lose its momentum at every stroke, the advantage resulting will be very great. The accomplishment of this object has been frequently attempted, but the machines have either had too much friction, or were liable to get out of order, and have, consequently, been abandoned; we have not learned the final fate of Mr. Eve's invention.

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35. For a composition for *Curing the Tooth-ache*, preventing

the teeth from decay, removing the tartar, and curing rheumatic pains; Thomas White, Pees Township, Belmont county, Ohio, July 29.

When we encounter quack medicines, we almost regret the rule which we have adopted, not to publish processes, or recipes, without the consent of the patentee; but still, as we think the rule a good one, it must not be violated. The composition above referred to, consists of a number of stimulating articles, several of which, either alone, or in combination, have been frequently used to give temporary relief in cases of tooth-ache; such articles, for example, as camphorated brandy, laudanum, oil of peppermint, camphor, nitric acid, opodeldoc, Venice turpentine, and tar; all of which are to aid in curing those afflicted with tooth-ache, tartar, and rheumatism.

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36. For an improved method of *Breaking and Dressing Hemp and Flax;* Amos Salisbury and John C. Langdon, Troy, New York, July 29.

At page 129, we have published a specification of a patent obtained by the same gentlemen, for a similar purpose, in which the flutes of the rollers used for breaking were formed of slats secured at their ends into round pieces, or heads, fixed at each end of the rollers. In the machine now patented, the general arrangement bears some resemblance to the former, whilst in several particulars it is essentially different. The breakers consist of fluted rollers, of which there may be five pairs, which it is proposed to make of cast-iron; they may be about two feet in length, and about six inches in diameter; they are, however, to diminish in size, gradually, from the first to the last pair; thus the first pair may be $6\frac{1}{4}$ inches in diameter, the second $6\frac{3}{8}$, and so on to the fifth pair, which, on this scale, would be 6 inches. The upper part of the frame in which the rollers are sustained, is an inclined plane, so that each successive pair of rollers stand a little below the preceding pair. The first pair may have five flutes, leaving five ridges, or leaves, from end to end; each successive pair to be finer than the last, the fifth pair having fourteen flutes. The rollers are placed in pairs over each other; the flutes, or spaces, between the ridges, or leaves, are two or three times the width of the leaves, in order that there may be sufficient space for the hemp, or flax, which is to be broken, to pass between them, as they mash into each other. Each of the rollers is turned by a cog wheel upon its axis, which causes each leaf to stand in the centre of its corresponding flute. The material to be broken is delivered by a feeding apron to the first pair of rollers, and is at length received on another apron from the last pair. In addition to the breaking rollers, there is a pair, denominated flyers, which follow the last pair of breakers; these are wooden cylinders, each furnished with six strips of iron about $\frac{3}{4}$ inch wide, and $\frac{1}{8}$ inch thick, placed at equal distances apart, and extending from end to end; the strips mash between each other like the leaves of the breakers, the cylinders are moved with considerable velocity, which causes the strips to operate

so as partially to dress the hemp, or flax, before its delivery upon the receiving apron. To complete the dressing, two other pairs of rollers are to be used. The first pair may be cylinders of wood, of ten or twelve inches in diameter, and of any desired length; along these, straight strips of metal are to be placed, like those on the last described rollers, and between each of these, other strips which are to be indented, or toothed. These cylinders run horizontally together, the strips of one mashing between those of the other; and the broken hemp, or flax, held in, and managed by, the hand, is to be allowed to hang down between them, it being moved up and down as required. Two other cylinders, called adjusting cylinders, are placed beneath these; they are smaller in diameter than the former, stand immediately under them, and are intended to prevent the fibres from becoming tangled, adhering to, and passing round, the dressing rollers.

The claims are to the gearing of the rollers at each end, so as to give firmness and strength to their movement; to the arrangement by which the ridges are kept in the centres of the flutes on the corresponding rollers; to the successive diminution of the rollers, and the corresponding diminution in the size and depth of the flutes; to the dressing cylinders with straight and indented plates; to the adjusting cylinders, and to the manner and principle in which the whole are regulated and made to operate.

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37. For a mode of *Making Roofs for Buildings in Brick Yards, Tan Yards, Salt Yards, Sugar Manufactories,* and for all purposes requiring the sun and air, occasionally, and the ability to exclude rain, snow, &c.; Nathaniel Adams, Marlboro,' Ulster county, New York, July 29.

The roof is to consist of leaves, or shutters, about four feet in width, which are to be hung to the plate, and ridge pole, upon pivots. When turned edgewise, they admit the sun and air, freely, and when flatwise, form a continued roof. Battens run down one edge, to close the joints when shut, and a strip is attached to each leaf, to hold it open, more or less, as may be required.

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38. For manufacturing the *Rims or Felloes of all kinds of Wheels* for wheel carriages, by steaming and bending the same; Merrit Blakeslee, Canaan, Litchfield county, Connecticut, July 29.

There is no formal claim in the specification of this patent, but the tenor of it renders it manifest that the intention of the patentee is to claim as his invention, the forming of the rims of wheels from a single piece, by bending; as, after describing a plan for bending on the outside of a circular mould, he observes that "it may be bent to the required form in various methods, and on, or within moulds."

Were fortune and the fates disposed to make bargains with us mortals, we would agree with the former to be able to keep our carriage for a term equal to that which has elapsed since we first saw

rims of this description, and willingly allow Atropos to cut the thread, when fortune claimed the vehicle.

A Mr. Viney obtained a patent in England for such wheels, more than forty years ago. They are mentioned under the article WHEEL, in Rees's Cyclopædia, and in many other works. Rees says, "Mr. Viny invented the process for bending timber into a circular form, practised for some time by Messrs. Jacob and Viny, and now continued by others." "By this mode of construction, the grain of the wood is kept parallel throughout, so that the periphery of the wheel is equally strong," &c. &c.

Some persons appear to think that the obtaining of a patent for an old affair, will have the effect of making it young again, but we apprehend it will be found that our courts and jurors are of a different opinion: were such indeed the fact, all our old men and women would apply to be patented, and the business of the patent office would soon become overwhelming.

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39. For a "General Specific for the *Cure of the Tooth-ache*;" Samuel Pennington, Mount Pleasant, Jefferson county, Ohio, July 30.

Our fellow citizens of Ohio, have now a double chance of having the tooth-ache cured, or rather suspended, without the application of cold steel. Tar, whiskey, French brandy, spirits of turpentine, and Indian turnip, will effect it in the hands of Mr. Pennington, and if not, they may try Mr. White, (No. 35,) and after all, may resort to the dentist and the Dutch claw, which is the true *specific*.

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40. For an improvement in the *Dry Dock*, being a new method of taking ships, and other vessels, out of the water; Elias Selden, Haddam, Middlesex county, Connecticut, July 30.

This *new* dry dock is constructed exactly like a common lock upon a canal, for raising boats from one level to another, and exactly as it has been repeatedly proposed to construct dry docks.

A dock is to be prepared, into which the vessel can be floated; it is then to be enclosed by gates; water is then to be pumped in, or to be supplied, from any convenient source, to float the vessel into a second dock, which must be sufficiently elevated to allow the water to run off, and leave it dry.

There is, in the specification, a particular account of lengths, widths, mortises, tenons, number of pieces, and various other things respecting the timber to be used; and according to the description, and the mere scratch which accompanies it as a drawing, it appears to be the design of the patentee to form his dry dock above ground, by framing timbers together, and planking them. It is much to be apprehended that his scheme, his dock we mean, would not "hold water," in which case a vessel would be in no danger of finding its way into this aerial establishment.

41. For a *Mode of Drawing Lotteries;* D. Malcolm, New Orleans, July 30.

Patents have been obtained by Messrs. Yates and M'Intyre, Mr. Cohen, and others, for modes of drawing lotteries by combinations of different kinds. Mr. Malcolm's plan differs from these in its enabling him to draw any number in the entire series, of which the blanks and prizes may consist, by putting a comparatively small number of tickets into his wheels. It is not thought necessary here to detail the particulars of the plan, but merely to give a general idea of it. There are to be three wheels; into two of them, numbers are put; into the third, the prizes, and from each of these wheels tickets are to be drawn simultaneously. Suppose the number 120 to be drawn from the first wheel, and the number 99, to be drawn from the second; these placed together, give the number 12,099, to which appertains the prize which was drawn at the same time with the numbers.

The claim is to "the combining of numbers drawn from two, or more, wheels, in such a way, that by putting a comparatively small number of billets into the wheels, any one number upon the whole series of tickets of which the class consists, may actually be drawn against either of the prizes in the prize wheel."

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42. For an improvement in the machinery for the *Manufacture of Grain into Flour*, or meal; William Parkinson, Ohio county, Virginia, July 31.

A number of patents have been obtained for grist mills with small stones; the mill above mentioned is of this kind, the stones being from eighteen to twenty-two inches in diameter, and the upper one is to be the runner. The manner of fixing the spindle, the balance rine, and several other parts, together with the form given to them, are particularly described, but the section given in the drawing is too small to admit of their representation, and it is entirely without written references. The upper stone is to be forced down by a screw passing through a crosstree above its centre; the point of this screw is steeled, and enters into a socket which is also steeled, and which contains oil. A spring of sufficient strength is so placed as to support the runner, and prevent its grinding against the bed stone when the mill is empty; the screw is used to force it down, and regulate its feed. The grain is to be carried low down into the eye of the runner, by means of a tube, that it may not be thrown out by the velocity of its motion, which is to be equal to about 360 revolutions in a minute.

The claims are to the formation of the husk which supports the stones; the running of the upper stone when confined by pressure; the figure of the balance rine, and its connexion with the spindle and driver; the pressure rod and screw, for forcing the upper stone down; the spring under the bridge-tree for sustaining it, and the tube for conducting the grain to the lower part of the eye.

Specification of a patent for an Improvement in the Rail-Road, and a Car adapted to run thereon, by means of which, roads, either curved or straight, are passed with equal facility. Granted to James Wright, *Columbia, Lancaster County, Pennsylvania, April* 17, 1829.

The improvement in the car consists in the construction of the wheels, which are so formed, that each wheel has two, three, or more rims of different diameters, with shoulders which serve as flanches, to keep the wheel upon the rail. The number of rims will depend upon the number of different curves in the different parts of the road. Where the curves are all of the same radius, two rims only will be required to each wheel. When the car, or carriage, runs upon a straight road, rims of equal diameters run upon the rails; when upon a curved road, the diameters of the rims employed, are, to each other, as the radii of the inner and the outer rails.

When the carriage leaves a curved for a straight road, a straight for a curved road, or one curve for another, the rails, at their places of meeting, do not form a continued line, nor are they on the same plane, a lateral offset being made, so that the rims of the proper diameters may take upon the new section, either straight or curved, upon which they are to pass. The difference in the elevation of the rails, is also made to correspond with the difference in the diameters of the rims, so that the wheels pass from one rail to another, without any jolt, or variation in the horizontal position of their axes.

What I claim as new is the whole of the arrangement herein described, by which the rims of different diameters upon the same wheel are adapted to pass upon rails, either straight or of different curvatures, and the laying of the rails in the manner described, so as to correspond with the structure of the wheels, without regard to the manner in which the carriage, or the road, is formed in other respects.

James Wright.

References to the drawing, Plate 3. *Fig.* 1.

A, the car, each wheel of which has flanches, and rims which are of different diameters.

B, B, the higher rails, which receive the rims of the smaller diameter; these rails are always on the inner line of the circle to be traversed.

C, C, the lower rails, which always bear the wheels in their full size.

Fig. 2.

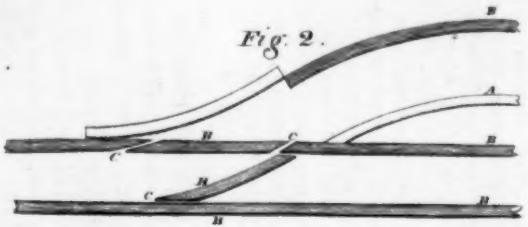


Fig. 3.

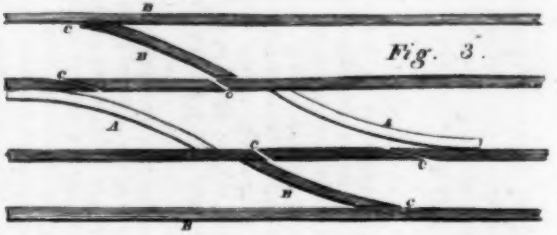
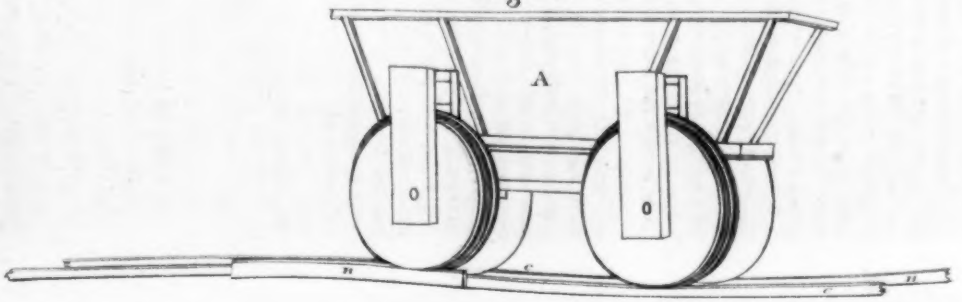
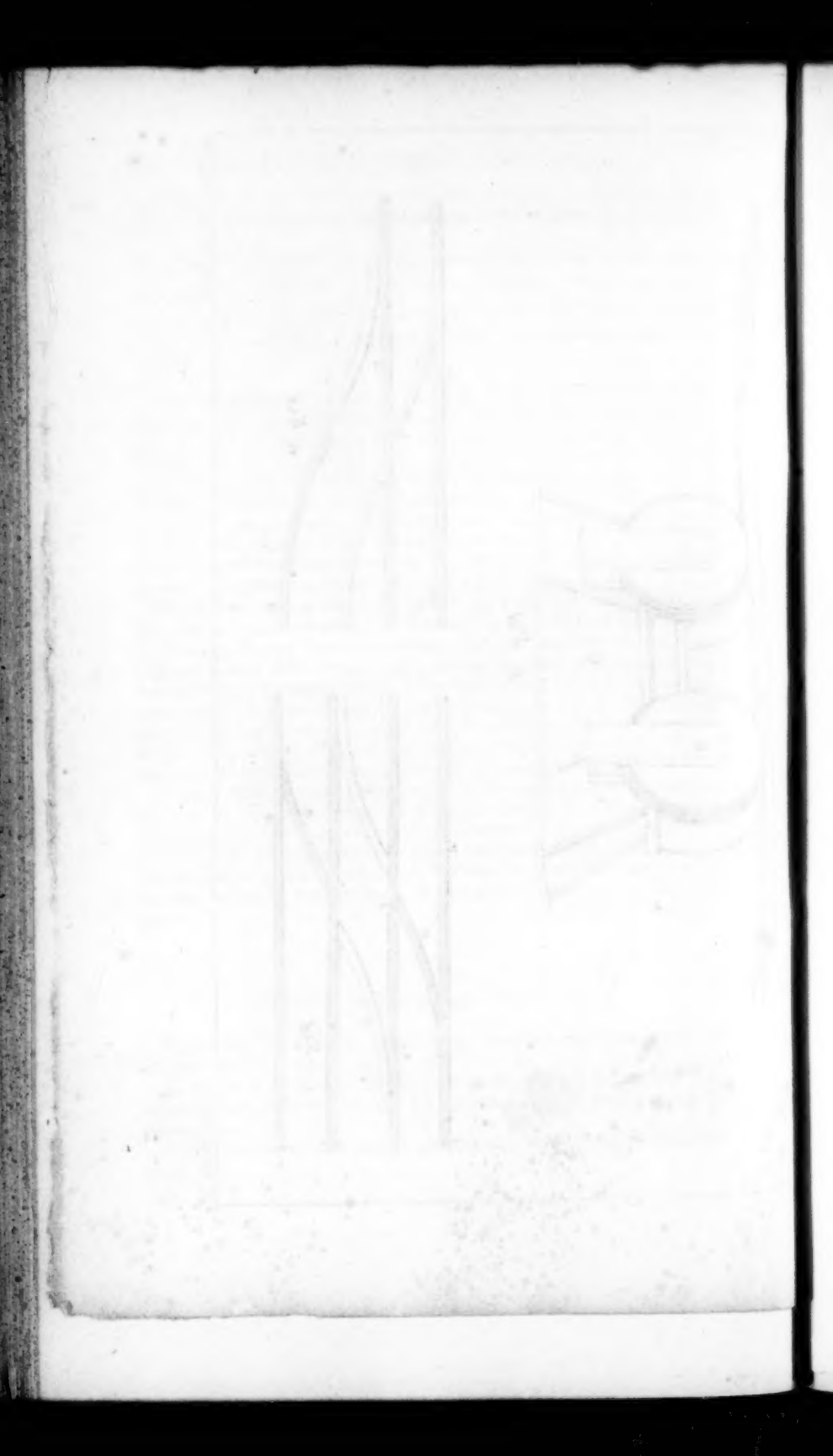


Fig. 1.





Specification of a patent for an improvement on the Rail-Road, by which a Rail-way Carriage may be made to turn out and in at the places intended for that purpose, on a single rail-way; or to pass from one track to the other where the road is double; which mode obviates the difficulties heretofore experienced in effecting this object. Granted to JAMES WRIGHT, *Columbia, Lancaster County, Pennsylvania, June 11th*, 1829.

THE rail-road carriage which I use, and the kind of rail upon which it runs, are fully described in the specification which I deposited in the patent office of the United States, and for which letters patent were granted unto me, bearing date the seventeenth day of April, one thousand eight hundred and twenty-nine, to which instrument, with the drawings which accompany the same, reference may be had, for the purpose of more clearly understanding the addition to, or improvement upon, the same, which I am now about to describe.

For the purpose of rendering this description clear, I deem it best to refer throughout to the accompanying drawings; that marked Fig. 2, Plate 3, representing a single track, with its turning-out place, and that marked Fig. 3, a double track, with the rails for passing from one to the other. In each of these drawings the same letters refer to corresponding parts. The rails marked A, A, are those upon which the rims of the wheels run which are of the larger diameter, and are, therefore, those which have the lesser elevation; those marked B, B, and which are shaded, are the more elevated rails, upon which the rims run that are of the smaller diameter. Those parts, C, C, that are left blank at the junction of the rails, are openings for the passage of the flanches of the wheels; these openings will not be of such a width as to present any sensible obstruction in the passage of the wheels over them.

It may sometimes be found useful, and I intend, occasionally, to apply a small thin piece of curved rail, of wrought iron or other material, at the commencement of the turn-out, which, when in its place, shall raise the higher rail sufficiently to prevent the larger rim from touching the lower rail, and which will necessarily have the effect of compelling the car to follow the curve; when this is out of its place, the rim of the smaller diameter will not touch the higher rail, and the car will consequently proceed straight forward. Pieces so used may be fixed upon a pivot, or hinge, in a way so simple that it is unnecessary further to describe it.

It will be seen by inspection that the higher rail does not, in any instance, cross the main road, but only occupies the space between the two roads, or tracks, or form one of the rails of the turn-out on the single track, and that the space left for the flanch to pass is always in the lower rail.

By the adoption of the foregoing plan, much of the expense heretofore encountered in constructing turn-out places, will be avoided,

as the distance to which they must extend will be very considerably decreased.

Any friction wheel, applicable to rail-way carriages of any other construction, may be applied to my carriage, constructed to operate on a straight or curved road.

What I claim as my own invention in the above described plan, is the whole arrangement of the rails of greater or lesser elevation, to my rail-road carriage, each wheel of which has rims of different diameters, so as to effect the purpose of turning out, and in, upon a rail-road.

JAMES WRIGHT.

Specification of a patent for a new and improved mode of causing Rail-way Carriages to run with equal facility on straight or curved roads; denominated the Self-adapting Rail-way Carriage, or Car. Granted to JAMES WRIGHT, *Columbia, Lancaster County, Pennsylvania, September* 10.

BE it known, that I, James Wright, of Columbia, in the County of Lancaster, and State of Pennsylvania, have invented a new and improved mode of causing rail-way carriages to run with equal facility upon straight or curved roads; which carriage, or car, so constructed, I denominate the SELF-ADAPTING RAIL-WAY CARRIAGE, OR CAR; and that the following is a full and exact description of my said improvement.

The wheels are firmly fixed upon the axles of the carriage; the axles turning in suitable boxes, or against friction wheels, constructed in any of the modes already known. The bearings in which the axles run, are attached to the frame work of the carriage, by a bolt, or pin, in their centres, in order to admit of such a degree of motion, or vibration, on these centres, as shall allow of the fore and hind wheels adapting themselves to the curvature of a road, by their planes forming a tangent to the curve of the rail upon which they are to run.

The wheels have each one flanch, and their edges, which run upon the rail, are in the form of the frustum of a cone, the flanch being upon the side of largest diameter, which usually stands within the rail, but it may be placed on the outside, without, in any way, varying the principle upon which it is to operate.

The angle which the edge of the wheel forms with its plane, may admit of considerable variation, and may be governed by the radius of the smallest curvature over which the carriage is to pass; as for example, should the curvature be upon a radius of three hundred feet, the angle will vary more from ninety degrees, than would be necessary for a curvature of six hundred feet. In every case the obliquity must be such, that in running upon the rails, a circumference shall be found upon the conical surfaces of the wheels, which shall adapt them to the running, without friction, upon each of the curved rails.

The kind of rail which I would prefer as best adapted to my im-

proved carriage, is the round topped rail; but any of the rails in ordinary use may be employed.

When a carriage, constructed in the manner above described, is placed upon a rail-road, it will be found that it has a tendency to adjust itself, and actually will adjust itself, so as to give to the wheels the positions necessary for running upon a road, either straight or curved, with no other than the ordinary rolling friction.

What I claim as new, and for which I ask an exclusive privilege, is the conical form of the edges of the wheels, and the vibratory motion of the axle, to allow of the wheels adapting themselves to the curvature of the rails.

Where, in any particular part of a road, it is desired to turn upon a smaller curve, than might be thought convenient by the foregoing plan, the addition of a rim may be made to the wheels, to operate upon an elevated rail, upon the principle described by me in the specification of a rail-way, and cars to run thereon, for which a patent was granted to me on the 17th day of April, 1829.

JAMES WRIGHT.

In the annexed drawing, Fig. 1 represents the plan of the carriage; and Fig. 2, the connexion of the axle with the carriage by means of a pin through its frame, and the frame in which the axle turns. Between the two frames friction wheels, or rollers, may be placed to sustain the load, and allow the axle to vibrate freely.

Fig. 1.

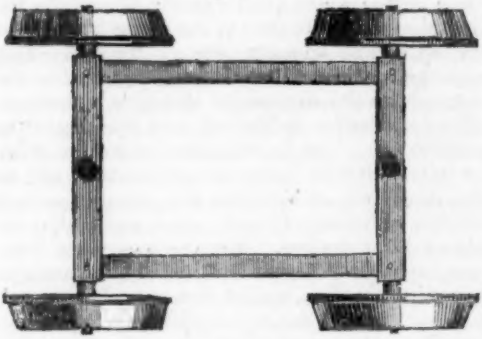


Fig. 2.

Specification of a patent for an improvement in the application of the Scape-heat from the high pressure Steam Engine, for which a patent was obtained October 30th, 1827; ALEXANDER BROWN, *Salina, Onondaga County, New York, June 11th, 1829.*

WHEREAS, Alexander Brown did, on the thirtieth day of October, one thousand eight hundred and twenty-seven, procure letters patent for a new and useful improvement in the application of the

scape-heat from the furnace, and the discharged steam from the engine of the ordinary high pressure steam engine, to the manufacturing of coarse salt from salt water; and which letters patent contain a description, or specification, of said improvement as follows; that is to say:—"When the ordinary high pressure steam engine is in operation, much of the heat from the fire in the furnace necessarily escapes through the furnace chimney, and most of the steam generated in the boiler, after performing its operation in the engine, is discharged from the engine. For the purpose of applying that scape-heat and discharged steam to the manufacturing of coarse salt from salt water, the ordinary high pressure steam engine is located in some convenient place. An ordinary salt water vat is erected, from plank or other material, of any given dimensions; say fifty feet by fifteen feet, and two feet deep, and placed on a level, as near as may be, with the bottom of the furnace of the steam engine, and at a short and suitable distance therefrom. The scape-heat and smoke, instead of being permitted to pass through and out of the chimney immediately connected with the furnace, are conducted by means of a metallic cylinder attached, one end thereof, to the furnace, and placed horizontally through the vat, and the other end thereof in a chimney erected on the outer, and the opposite side of the vat, from the furnace; which vat being filled with salt water, sufficient, at least, to cover the cylinder, receives the heat from the cylinder. A second cylinder, for distinction termed the steam cylinder, is also placed horizontally through the aforesaid vat, and one end thereof united to that part of the steam engine which discharges the steam from the engine, and of sufficient dimensions to convey the steam freely, and the other end on the outer and opposite side of the vat. This steam cylinder conveys the heat from the discharged steam, to the water in the vat, and conducts the discharged steam, or the water, should the steam in the cylinder be condensed, and discharges the same on the outside of the vat. The heat imparted from the cylinders to the salt water in the vat will cause an evaporation, and as the salt water contains in solution, besides the salt, some impurities having less affinity for the water than the salt, these settle after the salt water is evaporated to saturation. For the purpose of freeing the salt from those impurities, a second vat, of similar material and equal dimensions with the first, called the crystallizing vat, is erected and placed near the first vat, and sufficiently low to permit the water from the first vat to run into the second. The water in the first vat, after it is saturated, and all the impurities have settled, is drawn off into the second vat, and the steam cylinder is continued through the second vat, and which will impart to the saturated water in that vat, heat sufficient to keep up an evaporation for crystallization, and produce the finest and purest of coarse salt.

"This improvement does not consist in any of the machinery of the high pressure steam engine, nor in the conducting heat or steam through salt water by means of metallic cylinders, nor in any particular formation, or location of the vats, but only in the application of the scape-heat and discharged steam, by means of the aforesaid

apparatus to the manufacturing of coarse salt from salt water, thereby saving that heat which is usually lost, and applying that steam which is, ordinarily, used only to heat the water in the feeder for the boiler, and as a very small proportion is adequate for that purpose, so much may still be used by permitting the steam cylinder to pass through the feeder. Thus the scape-heat and discharged steam are applied to a useful and profitable purpose, without impairing the power of the steam engine, or diverting it from its destined operation.

And whereas, also, the said Alexander Brown hath, by experiment, discovered and established some material improvements on said patent: now therefore the said Alexander Brown is desirous that the said improvements may be patented to him, of which improvements the following is the specification.

The scape-heat from the furnace, instead of being conducted through a metallic cylinder, as in the aforesaid specification mentioned, is applied to a common sheet iron pan of any given dimensions, say twelve feet square and two feet deep, and which pan is placed between the furnace and the chimney, and with sufficient elevation to permit the heat and smoke from the furnace to pass freely, and not obstruct the draught of the furnace. This pan is used for heating the water which feeds the boiler of the steam engine, and is, for distinction, called the feeder. Salt water from the fountain may be put into the feeder, so that the boiler will be supplied with salt water instead of fresh water, and thereby the salt water in the boiler will be reduced to a state of saturation, or very nearly so. And in case the boiler is supplied with salt water, a discharging valve is placed in the boiler at some convenient place, and as near the bottom thereof as may be; and by which valve the water in the boiler, when saturated, is discharged, to prevent the forming of salt or the settling of the impurities in the boiler. The discharged saturated water is conducted from the discharging valve by a suitable conductor of wood or other material to the settling vat, in the aforesaid specification mentioned; and which settling vat, instead of being placed between the furnace and the chimney, as in the aforesaid specification mentioned, is placed in some other and convenient place, and as near the boiler and crystallizing vat, in the aforesaid specification mentioned, as may be, and of a proper elevation to receive the saturated water discharged from the boiler, and to permit it to run into the crystallizing vat. And the conducting of the water thereafter is the same as in the aforesaid specification mentioned.

And also for the purpose of manufacturing fine salt, the crystallizing vat in said specification mentioned may be used; but to enable the manufacturer to make both coarse and fine salt at the same time, a third vat is made of any given dimensions, say the same as the said crystallizing vat, and of the same material, and placed as near to the said crystallizing vat as may be, and sufficiently low to permit the water from the said crystallizing vat to run into the said third vat, through which the steam conductor also is passed, and which third vat, for

distinction, is called the fine salt vat; the saturated water is drawn from the crystallizing vat into the fine salt vat, and over the top of the fine salt vat, and as near the surface of the water therein as may be, is passed a conductor of wood, or tin, or other material, of about two inches in diameter, and conducted back and forth across the said vat, at about three feet apart, and the underside of which conductor, at about every three feet, has a small hole perforated therein of about the size of an ordinary nail gimblet, and which conductor, for distinction, is called the air conductor; one end of the air conductor is attached to an ordinary air furnace pump, or bellows, and which air pump or bellows is attached to, and carried by the steam engine. And when the steam engine is in operation, the said air pump, or bellows, causes a constant current of air to pass in the air conductor, and out of the small holes so perforated therein as aforesaid, and blows upon the surface of the water, and thereby causes the evaporation, in a given time, to be more rapid, and by agitating the surface of the water in the fine salt vat, prevents its crystallizing, and the salt settles at the bottom of the vat, and is fine and of a superior quality.

These improvements consist, principally, and materially, in two things, to wit:—

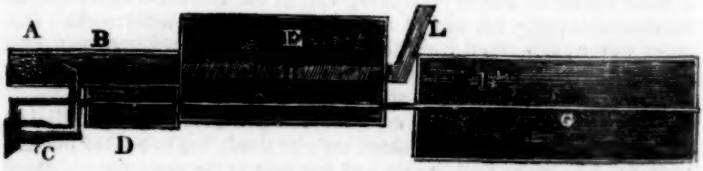
First—In using salt water in the boiler of the steam engine, instead of fresh water, and thereby causing a direct application of the heat applied to the boiler, to the evaporation of the salt water, and saturating the same in the boiler, or as near as may be, before it is vented and conducted into the settling vat.

Secondly—In the application of a current of air acting upon the surface of water in the fine salt vat, and thereby accelerating the evaporation, and producing a superior quality of fine salt.

These improvements, as far as they embrace the machinery and apparatus herein before specified, or mentioned, are not desired to be patented, but only the application of them, and the manner and effect of using them. The power required to carry the air pump, or bellows, will be trifling, and not much divert or impair the power of the steam engine.

ALEXANDER BROWN.

Fig. 1.



Description of the Drawings.

Fig. 1, is the apparatus under the old patent.

Fig. 2, the improvements in the present patent.

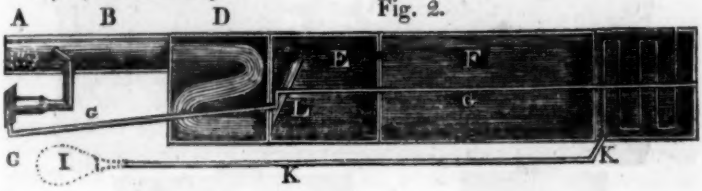
A, A, the mouths of the furnaces,

B, B, the boilers.

C, C, parts of the steam engine.

D, D, the feeder in the old patent, and sheet iron pan and feeder, in the improvements.
E, E, the settling vats.
F, F, the crystallizing vats.
G, G, the steam conductors.
H, the metallic cylinder.
I, the air pump, or bellows.
K, the air conductor.
L, L, the chimneys.

Fig. 2.

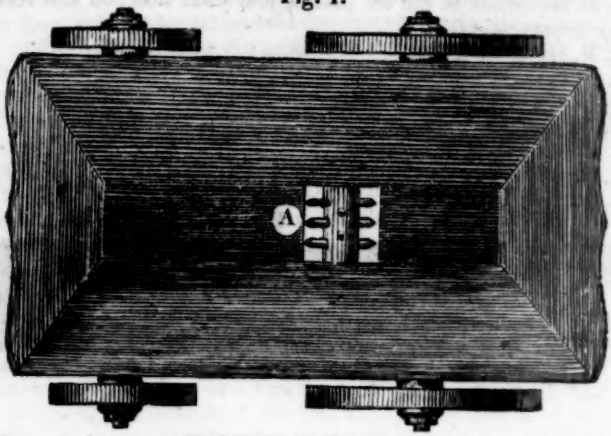


Description of a machine for scattering manure upon land, by means of a 'Manuring Wagon,' patented by James Bowman, *Beaufort, South Carolina, August 12th,* 1829.

Every agriculturist is aware of the immense labour attending this process, as it is ordinarily performed; a labour so great as frequently to prevent its being undertaken, notwithstanding the manure may be at command. The scattering, when done by hand, is generally very irregular, the consequences of which are plainly to be seen in the unequal growth of the crop, as vegetation advances. These difficulties have been completely obviated by the invention of Mr. Bowman, who has satisfactorily tested the value of his machine, before applying for a patent; the facility, rapidity, and perfection with which it acts, not only excited the admiration of a number of intelligent planters in his immediate neighbourhood, who witnessed it, but far exceeded his own expectations. The plan was undertaken without the most remote idea of obtaining a patent, which was suggested only by the excellence of the instrument itself.

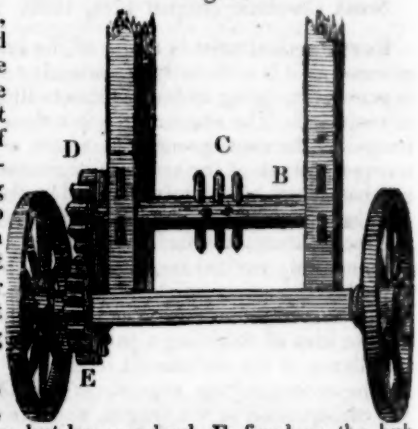
The accompanying engravings will afford a very correct idea of the construction of the wagon, and the apparatus for scattering the manure. Fig. 1, gives a bird's eye view of the body of the wagon, which is of the size commonly used for agricultural purposes. Its sides are inclined planes, meeting the bottom at an obtuse angle. In the bottom, near the hinder axle, there is an opening made, as seen at A, of about two feet in length, and eighteen inches in width.

Fig. 1.



Through this opening the manure is to pass, as it is scattered by the machinery seen in Fig. 2, which represents the hinder part of the frame of the wagon to which it is attached.

Fig. 2.



B is a revolving shaft, usually made square, and which crosses the bed of the wagon at a short distance from the axle. This shaft carries ten pins, made of iron, or of any other suitable material, and extending out a sufficient length to occupy the aperture left in the bottom of the wagon, but without touching its sides or edges. These are seen at C, and also in the opening at Fig. 1.

Upon the end of the shaft, there is a cog-wheel, D, which is turned by a similar, but larger wheel, E, fixed on the hub of one of the hind wheels; and, of course, when the wagon is drawn forward, the shaft will revolve, and the manure be scattered. Mortise holes are represented upon the frame, on each side of the shafts; these are to receive wedges, by means of which the shaft may be thrown in or out of gear. An ordinary hand can drive the wagon, and shovel the manure towards the opening, and in this way perform the labour of several strong and able men.

FRANKLIN INSTITUTE.

Monthly Meeting.

A Stated Monthly Meeting of the Institute was held at their Hall, September 24, 1829.

Mr. S. J. Robbins was called to the chair, and William Hamilton was appointed Secretary, pro tem.

The minutes of the last meeting were read and approved.

The following donations were made to the library and cabinet of minerals, viz. Nicholson's Practical Builder, in seventeen parts; and Nicholson's New Carpenter's Guide; presented by Mr. J. G. Yatman. Bigelow's Elements of Technology; presented by Hilliard, Gray & Co. Two Addresses, delivered before the American Institute, July 4, 1828, and July 4, 1829. Three Reports of Committees to the American Institute; presented by the American Institute of New York. *Instructions, Théorique et Pratique Sur les Brevets D'Invention. Exposition D'un Nouveau Systeme de Perspective;* presented by J. G. V. De Moléon. Several Specimens of Minerals from Massachusetts; presented by W. R. Johnson.

The Corresponding Secretary also presented the following Mechanical and Scientific Journals, received in exchange for the Journal of the Institute:—London Journal of Arts and Sciences for August, 1829; London Register of Arts, and Journal of Patent Inventions, for August, 1829; Gill's Technological and Microscopic Repository for August, 1829; *Annales des Mines*, Vol. 4, No. 6, and Vol. 5, No. 1; *Annales de Chimie et de Physique* for March and April, 1829; *Bulletin de la Société D'Encouragement pour L'Industrie Nationale*, for March and April, 1829; *Journal des Connoissance Usuelles et Pratiques* for June, 1829; *Recuiil Industriel, Manufacturier, Agricole et Commercial*, for April, 1829; *Bibliothéque Physico-économique* for June, 1821.

The Committee on Inventions presented reports on the following inventions and improvements submitted to them for examination, by the inventors, viz. On a Compound Protractor, by Ennion Williams, of Philadelphia. On a Combined and Rotary Protractor. On a machine for ascertaining and marking, in a profile form, the Soundings of Coasts, Bays and Harbours, by Ebenezer Cooley, M. D. On an improved Rail-road Car, by Mr. James Wright, of Columbia, Pennsylvania. On an improvement in Locomotive Engines, by W. R. Hopkins, of Albany, New York.

The Corresponding Secretary, Dr. Hays, communicated to the meeting letters from J. G. V. De Moléon, Chief Engineer of the Domains of France; from the Franklin Institute of Rochester, New York; from the Maclurian Lyceum of Science of Philadelphia; and two from the American Institute of New York.

W. R. Johnson submitted for examination two modifications of apparatus for igniting spongy platina, by hydrogen gas, on which apparatus some observations were offered.

The following queries were submitted for discussion, which were read, and laid on the table, viz.

1st. What is the best construction of Barker's mill, and what its maximum effect?

2nd. What is the true mode of computing the power of high pressure steam engines?

3d. What is the proper height of a carriage wheel, with an axis of a given diameter, in order to be most efficacious in aiding the draught of horses in transportation?

4th. What is the absolute centrifugal force of a body revolving in a circle of a given diameter d, with a given velocity v?

5th. What is the rationale of the action of hydrogen gas on spongy platina, as discovered by Doëbereiner?

6th. Which will move down an inclined plane with the greatest velocity, a wheel of two, or one of four feet in diameter, supposing their weights the same, and the matter of each to be all disposed around in its periphery?

(Extract from the Minutes.)

S. J. Robbins, *Chairman.*

W. Hamilton, *Secretary, pro tem.*

TO THE FRANKLIN INSTITUTE.

The following is submitted as an answer to some of the questions formerly proposed for discussion.

Very respectfully,

Charles Potts.

August 17th, 1829.

Quest. What shaped aperture will deliver the greatest quantity of water in a given time and under a given head?

The obvious extent and importance of this question, has called forward many of the most celebrated philosophers and mathematicians to its investigation. Numerous and diversified experiments have been instituted, from some of which I shall endeavour to select such practical results as have been obtained, and which seem most likely to answer to the conditions of the question.

In the discharge of water through simple apertures, either in the sides or bottom of a reservoir, it is evident that with respect to the resistance which tends to diminish the full or natural discharge, we can have very little doubt whether the shape of the aperture ought, in order to present the least rubbing surface, to be square, triangular, or otherwise, since we know that of all equal areas, the circle has the least peremiter or circumference. Hence, if we suppose the water to be discharged through an orifice made in a thin plate, that discharge will be the greatest when the aperture has a circular form. The experiments of Bossut confirm this conclusion in a very satisfactory manner.

This might be submitted as a full answer to the question, were we to limit it to the phraseology of its expression: but as I conceive not only apertures, but also such contrivances as are denominated *adjutages*, from their property of promoting the discharge of water, to be implied in the question, I shall extend the inquiry on this construction.

Newton first noticed that running water delivered through apertures did not preserve an equal section, but that the column after leaving the aperture gradually decreased in thickness for a distance about equal to the diameter of the orifice, after which it increased. This contraction of the effluent stream, which is evidently owing to the filaments of water in the reservoir being drawn towards the aperture by forces acting in different directions, is what demands particular attention, inasmuch as the proper shape of the adjutage called for in the proposition is found to depend upon it.

One of the primary objects in the experimental researches of Bossut and Michellotti, was to determine the different effects of this contraction under different circumstances. Michellotti, after carefully examining the form which the water naturally assumed in its effluent state, determined the figure or shape of that part of the natural jet between the vena contracta and the reservoir, to be that formed by the revolution of the trochoid (cycloid) around the axis of the jet, with dimensions having the following ratio.

Diameter of the outer orifice (vena contracta)	= 36.
Do. inner	= 46.
Length of the axis	= 96.

The effect of this adjutage was such as to give a discharge of 983 when the natural discharge would have been 1000.

According to the results deduced by Eytelwein, a conical tube approaching to the figure of the contracted vein produced a discharge equal to .98 of the full velocity, which agrees in a striking manner with the preceding.

With the view of showing more fully the effect of short tubes on the discharge of water, and also of drawing a comparison with the above mentioned adjutage, I shall quote the results of several experiments instituted by professor Venturi on this head. These experiments are considered highly important in practical hydraulics.

The same quantity of water, 4.845 English cubic feet, flowed out of the same vessel, which was kept constantly full, through the following adjutages, in the time annexed, which is expressed in seconds. The altitude of the water above the centre of the aperture of the adjutage was always equal to 34.642 English inches.

Fig. 1.

Through a simple circular aperture, Fig. 1, in a thin plate, diameter = 1.6 inches, in 41.″

Fig. 2.

Through a cylindrical tube, Fig. 2, diameter as above, and 4.8 inches long, in 31."

Fig. 3.

Through the tube, Fig. 3, which differs from the preceding in being contracted in the middle, in 31."

Fig. 4.

Through the short conical adjutage, Fig. 4, which is only the first part of the preceding, in 42."

Fig. 5.

Through the pipe, Fig. 5, which consists of a cylindrical tube adapted to the small end of the above, and of the same diameter, AD being 3.2 inches long, in 42.5."

Through a like adjutage, but longer, AD being 12.8 inches, in 45."

Through the like, AD being 25.6 inches, in 48."

Fig. 6.

Through an adjutage, Fig. 6, consisting of the simple tube, Fig. 2, placed over the conical part of Fig. 4, in 32.5."

Fig. 7.

Through the double cone, Fig. 7, the dimensions of which AB = EF = 1.6 inches, AC = 0.977 inches, CD = 1.376 inches, and the length of outer cone = 4.351 inches, in 27.5."

Fig. 8.

Through the adjutage, Fig. 8, consisting of a cylindrical tube 3.2 inches long and 1.376 inches in diameter interposed between the two conical parts of the preceding, in 28.5."

From these experiments, it appears that the effect of the double coned adjutage, Fig. 6, which was the best in these experiments, was

such as to increase the discharge through the simple circular aperture about *one-third*. This adjutage, however, does not equal that found by Michellotti. For, we have the time in which the quantity of water answering to this case would have been discharged by theory equal 25.5." Hence, the effect of this adjutage gives a discharge of only .92 of the full velocity, whereas that found by Michellotti, as has been observed, is .983.

From the experiments of Venturi, we further observed that the velocity of the water through a simple conical adjutage was considerably augmented by the addition of another similar tube; hence the inquiry might be suggested, whether the adjutage as determined by Michellotti, might not be improved by the addition of a small tube beyond the vena contracta. This question, however, and many others appertaining to this subject, I have no doubt will shortly be satisfactorily solved by this Institute.

Quest. Will a double velocity of water, when the quantity is given, produce more than a double effect?

This question is easily answered in the negative; for it is evident that as the momentum or effect is as the quantity of water and its velocity directly; when the velocity is doubled the effect will be doubled *only*. This question is analogous to the one preceding, relating to the double impulse, which has already been answered by a member at the last meeting.

Quest. Does the production of a rotary, from a rectiliner motio n, by means of a crank, involve a loss of power?

The simplicity of the crank, as the means of changing the rectilinear into that of a rotary motion, and vice versa, is much in its favour. It is, however, as will be shown in the sequel, an unprofitable servant, particularly when it is desirable to economize power.

Suppose the rectilinear force to be directed towards the centre of the shaft whereon the crank is fixed, which is the most ordinary relation between the two motions; and, that the rectilinear force is transmitted to the crank by a connecting rod. It is evident that in the progress of motion, the connecting rod and crank form all possible angles with each other in the period of each revolution. Hence it must be obvious, from a well known law in mechanics, viz. "that the force or energy of action is as the sine of the angle of incidence," that the power which is transmitted to the crank must be extremely variable. Thus, when the crank and connecting rod are in the same right line, the rectilinear force has no tendency whatever to turn the crank; this occurs twice in every revolution, viz. when the crank is on the centres.

When the crank, however, has made the least angle with the connecting rod, the force or energy begins to operate on the crank to turn it round, and to increase, as the angle formed by the crank and connecting rod decreases, until they make a right angle, or the connecting rod becomes a tangent to the crank's revolution, at which place the effective force transmitted to the crank becomes a maximum, or the greatest possible. But even here we may observe, when

the rectilinear force is applied as in the supposition, the whole of the energy is not transmitted to the crank (inasmuch as the direction of the rectilinear force does not fall perpendicular on the crank at the same moment) but approximates to it as the ratio between the lengths of the crank and connecting rod is increased. Hence the advantage of long connecting rods.

With the view of exhibiting more clearly the variability of the force exerted by the crank, I shall assume the following proportions as existing between the parts of the engine. Length of the connecting rod equal 3, that of the crank equal $\frac{1}{2}$. If, now, we represent the measure of the rectilinear force by unity, we shall have the effective force transmitted to the crank during the period of one revolution, as in the following table, commencing from that point when the connecting rod and crank form one extended right line.

From this table, which is sufficiently accurate for the purpose of comparison, we have the average force transmitted to the crank equal to $\frac{62}{100}$ of the rectilinear force, hence it follows, that the production of a rotary from a rectilinear motion, by means of a crank, involves a loss equal to $\frac{3}{8}$ of the power.

TABLE.

When the crank has moved.	*The angle made by con. rod and crank.*	*Effective force of the crank.*
Degrees.	Deg. min.	Decimals.
0.	180. 00	.0000
10.	168. 20	.1736
20.	156. 40	.3420
30.	145. 14	.5000
40.	133. 51	.6428
50.	122. 40	.7660
60.	111. 42	.8660
70.	101. 00	.9396
80.	90. 33	.9848
80. 24′	90. 00	.9863
90.	80. 25	.9860
100.	70. 33	.9848
110.	61. 00	.9396
120.	51. 42	.8660
130.	42. 40	.7660
140.	33. 51	.6428
150.	25. 14	.5000
160.	16. 43	.3420
170.	8. 20	.1736
180.	0. 00	.0000

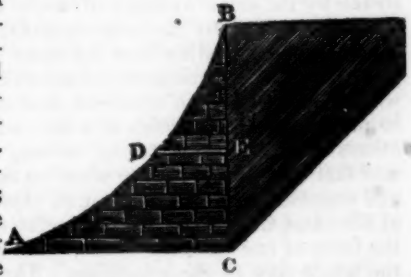
Quest. Which is most advantageous in sustaining the floor of a room 24 feet wide; a girder consisting of a single piece of timber 15 inches in depth, or another composed of 2 pieces of the same length and width, one ten, and the other five inches in depth, laid one upon the other; and what is the relative advantage gained by each?

The lateral strength of beams being to each other as the breadth

and square of the depth, we have, by assuming the given breadth of the beams $= b$, and the depth of the largest beam $= 15$ inches $= d$; the relative strength of the single girder $= bd^2$; and the relative strength of the compound girder, which is equal to the sum of its parts, equal $b \times (\frac{2}{3}\,d)^2 + b \times (\frac{1}{3}\,d)^2$, that is, equal to $\frac{5}{9}\,bd^2$. Hence, if we put unity for the absolute strength of the single girder, we shall have the absolute strength of the compound girder equal $\frac{5}{9}$: or, in other words, the single beam will be $\frac{1}{5}$ the strongest.

Quest. What is the proper figure of a wall to resist the pressure of earth acting at an angle of 45 *degrees?*

Let the wall be represented by the line ABC, in the adjoining figure. Put the perpendicular height of the wall $BC = a$. The variable abscissa $BE = x$, and its corresponding ordinate $DE = y$. Now the mean of the pressure on BE or x is at $\frac{1}{2}\,x$; and the effect of the pressure at this point to overturn or break the wall at C, is as the number of particles (x) and the lever $a - \frac{1}{2}\,x$. That is, the effect of the pressure at this point will be as $(a - \frac{1}{2}\,x)\,x$.



The fluxion of the force, therefore, at this point, is $adx - xdx$. Hence the fluxion of the effect of *all* the forces on the line BE, will be $(adx - xdx)\,x = axdx - x^2dx$. Wherefore, by integrating, we shall have $\dot{|}\,axdx - x^2dx = \frac{1}{2}\,ax^2 - \frac{1}{3}\,x^3$. Therefore, when $x = a$, we have the whole effect to break the wall at C equal $\frac{1}{6}\,a^3$. Hence it follows that the effect of the pressure to break the wall is in the triplicate ratio of the height; that is, the effect at C, is to the effect at any other point E, as BC^3 to BE^3. Now the strength of the wall to resist fracture in any point, as at E for instance, being as the square of the thickness DE^2, it follows that the wall, in order to be equally strong throughout its height, must have x^3 always proportional to y^2. As this property is known to exist between the abscissa and ordinates of the semi-cubical parabola, this, therefore, is the proper figure (ADB) required by the question. With regard to the given angle at which the earth is supposed to act, we may observe that this tends only to affect the energy, and not the relation of the pressure throughout the height of the wall.

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Observations on the Force of Bodies in Motion, in reply to the remarks of J. P. E. *upon that subject.*

At p. 212 of the last number of the Journal of the Franklin Institute, there is a communication signed J. P. E., intended as a

reply to some remarks in the preceding number, on the power of heavy bodies in motion, the writer of which commences with "*Proposition 1st*, if a double velocity in the same quantity of water gives a double force, then it will raise, when applied to mill wheels, double the weight to double the height, in the same time." If the writer intends, in the foregoing proposition, that when the float-boards of wheels are moving with a double velocity, and they be struck by the same quantity of water with a double force, the effect will be as stated, he is correct; but it does not follow that when the same quantity has struck with a double *force*, that it will have struck the floats with a double *velocity;* or, when it is known that one wheel is struck by the same quantity of water at velocity one, and another wheel be struck by the same quantity at velocity two, in a given time, it does not follow that the same number of particles will expend their force at the same instant on each wheel. Suppose a water wheel to be 10 feet in diameter, and containing 30 float-boards, to be propelled by a quantity of water, whose volume is 1 foot wide, 4 inches deep, and 30 feet long, moving on the wheel at velocity one, and that this will cause the wheel to make one turn in 20 seconds, and suppose some given section of this volume to act on the wheel at the same time, say 1 foot, then the wheel will be urged round by the force of one-thirtieth of the whole quantity of water throughout the whole time of the operation. Then, suppose another wheel 20 feet diameter, with 60 float-boards, to be propelled the same length of time, by the same quantity of water moving with velocity two, it is evident that the volume of water must be 60 feet long, 1 foot wide, and two inches deep, and that no greater length of this volume can act on the wheel at the same time, than in the first case, viz. one foot, which will be one section for each float-board, and a force equal to one-sixtieth part of the whole volume will act through the whole time, the result will not be changed by assuming a greater or less length of the volumes of water to act at the same time on both wheels, nor by using wheels of equal size. I therefore conclude, that when a particle of water strikes the float-board of a wheel with a double velocity, it impresses on it *more* than a double force.

J. P. E. says, that "the following experiment, which is laid down in the books, I consider as direct proof, that the momentum of bodies is as their velocity, and not as the square of their velocity, as the writer above mentioned endeavours to prove. I took two balls of soft clay, one double the weight of the other, and hung them by strings of equal length, to a nail in the wall. I then drew them in opposite directions from *the line of direction*, the smallest to double the distance of the other, and let them fall towards each other; when they met, all motion ceased; proving that the double velocity of the smaller body, which it is known to acquire, in the present circumstances, exactly counterbalanced the double weight of the other body, with half the velocity."

Here he leaves no room to doubt his meaning of the word momentum, as being synonymous with power; and, consequently, that a double velocity of water gives a double power, which leaves him in

the dilemma, of having endeavoured to support that a double power of water will produce a quadruple effect, as he says a double velocity is known to do. Were it not for the above experiment, I should have supposed that he considered the question at issue to regard the simple forces of bodies in motion, without regard to their utmost power; this, however, cannot be the question, for the forces of bodies in motion do not exist, excepting when some resisting force opposes their motion. It is evident that the simple force of a body, whatever be the quantity of matter, or its velocity, when acting on another body, must always be equal to the force with which the latter body resists it, until the body in motion be stopped: for, if 100 lb. of matter, moving with any given velocity, strike one pound at rest, the simple force exerted must be equal to the inertia of the one pound; but if it had struck fifty pounds, the force would have been equal to the inertia of fifty pounds; and if the body at rest be unmoved by the collision, and it, as well as the moving body, were perfectly hard and perfectly non-elastic, then the force impressed would be exactly equal to the power of the moving body; but as we have no materials perfectly hard and non-elastic, the force impressed by collision can never equal the momentum of the moving body; hence the question at issue does not apply exclusively to simple forces.

With respect to friction, J. P. E. says, "I performed a number of experiments in the presence of the gentleman whose opinions are here controverted, which I need not now detail, all showing that the spaces passed over by a body on a horizontal plane, when the body comes to rest, are as the squares of the velocity; that is, with a double velocity, a body will move four times as far, and with a triple velocity, nine times as far, &c. before it comes to rest."

This experiment has further confirmed the theory which he endeavours to controvert; viz. that the powers of bodies in motion are as the squares of their velocities, and that the momentum destroyed by friction, will be equal in equal spaces passed over; thus it appears, although "one experimental truth may be of more value than a thousand ingenious theories," that in this case, as it undoubtedly is in many others, when truths have been established by experiments, different individuals make different deductions from them, to suit their preconceived theories, instead of carefully examining the laws which govern the results; the neglect to do which, may, and frequently does, lead to practical errors; for if J. P. E. should wish to erect machinery requiring a fly wheel of a given weight, to be moved with a given velocity, but, from a change of arrangement, or some other cause, he should find it more convenient to drive the fly with only half the computed velocity, he would double the quantity of matter to compensate for the diminished velocity, whilst his antagonist would quadruple the weight to obtain the same effect. In such a case, although they both suppose themselves acting with knowledge obtained by practical experiment, either one or the other of them must have committed a serious practical error, which a careful "inquiry into causes would have prevented."

If J. P. E. wishes a further investigation of this subject, will it not be best for him first to state particularly such experiments as he may have witnessed, or that are "laid down in the books," which are most relied on by him to establish his theory? JERSEY.

Mode of Preserving Eggs.

The Revue Encyclopedique (vol. 38, 1828) contains the annunciation of a mode of keeping eggs fresh, by placing them in a solution of chloride of lime.

A later number of the same magazine, (vol. 40, October, 1828) gives an extract of a letter from M. Peschier, of Geneva, claiming for his brother, a druggist of that place, the merit of the discovery of a more economical mode of effecting the same object, by placing the eggs in *lime water*. This letter is accompanied by an account of the results of experiments made, in which eggs had been kept sound for six years by this method.

A friend educated in Connecticut, assures me that this method of keeping eggs has long been known and practised in that state.

B.

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Notice of an article at p. 214 of the last number of the Journal of the Franklin Institute.

MR. EDITOR,—On looking over the last number of the Journal of the Franklin Institute, I noticed some remarks on a "Reply to the query, does a body descending on an inclined plane with an accelerated motion, press the plane with the same force through every portion of its length?" The conclusion drawn in your remarks, appears to me to be incorrect.

You say that the rapidity of motion acts in the same manner as a centrifugal force in preventing the body from pressing the plane. This cannot be so, for the plain reason, that there can be no effect produced without a cause, no matter what projectile velocity you give the body in the direction of the plane, it cannot, in the least degree, affect that portion of gravity which acts perpendicular to the given force. It must be clearly perceived that that portion of gravity will remain constant, and will, consequently, cause the body to exert a uniform pressure on all parts of the plane, as shown in the diagram given in my previous solution.

The only effect that an increased velocity can have, in the matter in question, is, to cause the body to remain a less portion of time on each particular part of the plane.

E. GRIFFETH.

Philadelphia, September 24th, 1829.